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# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document specifies requirements for support of Radio Resource Management for the FDD and TDD modes of Evolved UTRA. These requirements include requirements on measurements in UTRAN and the UE as well as requirements on node dynamical behaviour and interaction, in terms of delay and response characteristics.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode"

[2] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".

[3] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures"

[4] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer; Measurements"

[5] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"

[6] 3GPP TS 25.302: "Services provided by the Physical Layer".

[7] 3GPP TS 25.331: "RRC Protocol Specification".

[8] 3GPP TS 45.008: "Radio subsystem link control".

[9] 3GPP TS 45.005: "Radio transmission and reception".

[10] 3GPP TS 45.010: "Radio subsystem synchronization".

[11] 3GPP2 C.S0024-B: "cdma2000 High Rate Packet Data Air Interface Specification".

[12] 3GPP2 C.S0002-D: "Physical Layer Standard for cdma2000 Spread Spectrum Systems - Release A".

[13] 3GPP2 C.S0033-B: "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Terminal".

[14] 3GPP2 C.S0011-C: "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations".

[15] 3GPP2 C.S0005-D: Upper Layer (Layer 3) Signaling Specification for cdma2000 Spread Spectrum Systems

[16] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation”

[17] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[18] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".

[19] 3GPP TS 25.123: "Requirements for Support of Radio Resource Management (TDD)".

[20] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[21] 3GPP TS 36. 212 "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[22] 3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer".

[23] 3GPP TS 36.521-3: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Radio Resource Management conformance testing".

[24] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".

[25] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2"

[26] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[27] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2"

[28] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP)".

[29] 3GPP TS 25.101: "UE Radio transmission and reception (FDD)".

[30] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

[31] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

[32] IEEE Standard 802.11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.

[33] 3GPP TS 23.303: "Technical Specification Group Services and System Aspects; Proximity-based services (ProSe); Stage 2".

[34] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[35] 3GPP TS 36.171: " Requirements for Support of Assisted Global Navigation Satellite System (A-GNSS)".

[36] 3GPP TS 36.305: " Stage 2 functional specification of User Equipment (UE) positioning in E-UTRAN".

[37] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".

[38] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[39] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[40] 3GPP TS 37.340: “Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity”, Stage 2.

[41] 3GPP TS 38.101: "NR; User Equipment (UE) radio transmission and reception".

[42] 3GPP TS 38.211: "NR; Physical channels and modulation”.

[43] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[44] 3GPP TS 38.212 "NR; Multiplexing and channel coding".

[45] 3GPP TS 38.202: "NR; Physical layer services provided by the physical layer".

[46] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[47] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".

[48] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[49] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".

[50] 3GPP TS 38.133: "NR; Requirements for support of radio resource management "

[51] 3GPP TS 38.214: " New Radio (NR); Physical layer procedures".

[52] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[53] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[54] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[55] 3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".

[56] 3GPP TS 24.368: "Non-Access Stratum (NAS) configuration Management Object (MO)"

[57] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access"

[58] 3GPP TS 38.215: "NR; Physical layer measurements".

[59] 3GPP TS 37.355: "LTE Positioning Protocol (LPP)"

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [26] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [26].

**Any Cell Selection state**: as defined in TS 36.304 [1]

**Asynchronous Dual Connectivity:** As defined in TS 36.331 [2].

**Carrier aggregation:** aggregation of two or more component carriers in order to support wider transmission bandwidths TS 36.104 [30].

**Dual Connectivity:** As defined in TS 36.331 [2].

**EN-DC:** E-UTRA-NR Dual Connectivity as defined in TS 37.340 [41, Section 4.1.2].

**en-gNB**: As defined in TS 37.340 [41].

**Extended IDLE-mode DRX:** extended DRX cycles in IDLE mode as specified in TS 24.008 [34], where one extended DRX cycle is a time period between two first paging occasions within two consecutive PTWs.

**Extended CONNECTED-mode DRX:** extended DRX cycles in CONNECTED mode as specified in TS 36.331 [2].

**FeMBMS/Unicast mixed cell:** an MBMS/Unicast cell performing MBMS transmissions as defined in TS 36.300 [25].

**Frame Structure 3**: frame structure type 3 as defined in TS 36.211 [16]

**gNB**: as defined in TS 38.300 [46]

**High operating band:** an operating band with a higher downlink frequency with respect to another, low, operating band.

**Inter-band carrier aggregation:** carrier aggregation of component carriers in different operating bands TS 36.104 [30].

**Intra-band contiguous carrier aggregation:** contiguous carriers aggregated in the same operating band TS 36.104 [30].

**Intra-band non-contiguous carrier aggregation:** non-contiguous carriers aggregated in the same operating band TS 36.104 [30].

**IDC autonomous denial subframes:** The maximum number of uplink subframes in which the UE is allowed not to transmit E-UTRAN signals when configured with IDC autonomous denial (TS 36.331 [2]).

**IDC autonomous denial validity:** It is the period over which the autonomous denial subframes are counted (TS 36.331 [2]).

**IDC solution:** This refers to DRX or IDC autonomous denial configured by eNodeB in response to receiving InDeviceCoexIndication from the UE (TS 36.331 [2]).

**Low operating band:** an operating band with a lower downlink frequency with respect to another, high, operating band.

**Master Cell Group:** As defined in TS 36.331 [2].

**Master eNB:** As defined in TS 36.300 [25].

**MBSFN ABS:** ABS configured in MBSFN-configurable subframe.

**NB-IoT Cell**: A cell for NB-IoT.

**NB-IoT**: As defined in TS 36.331 [2].

**ng-eNB**: As defined in TS 38.300 [46].

**NE-DC**: NR-E-UTRA Dual Connectivity as defined in clause 4.1.3.2 of TS 37.340 [41].

**NGEN-DC**: NG-RAN E-UTRA-NR Dual Connectivity as defined in clause 4.1.3.1 of TS 37.340 [41].

**Non-MBSFN ABS**: ABS configured in any downlink subframe.

**Normal Performance Group:** For UE which supports Increased UE carrier monitoring UTRA or E-UTRA the group of inter-frequency carriers or inter-RAT carriers is divided into two groups. The group which has a better delay performance compared to the other group is refered to as the normal performance group.

**Paging Time Window:** As defined in TS 24.008 [34].

**Primary Cell**: As defined in TS 36.331 [2].

**ProSe Direct Communication**: As defined in TS 23.303 [33]

**ProSe Direct Discovery**: As defined in TS 23.303 [33]

**Primary SCell:** As defined in TS 36.331 [2].

**Primary Secondary Timing Advance Group**: Timing Advance Group containing the PSCell.

**Primary Timing Advance Group**: Timing Advance Group containing the PCell.

**Reduced Performance Group:** For UE which supports Increased UE carrier monitoring UTRA or E-UTRA the group of inter-frequency carriers or inter-RAT carriers is divided into two groups. The group which has worse delay performance compared to the other group is refered to as the reduced performance group

**Secondary Cell**: As defined in TS 36.331 [2].

**Secondary eNB**: As defined in TS 36.300 [25].

**Serving Cell**: As defined in TS 36.331 [2].

**Secondary Cell Group:** As defined in TS 36.331 [2].

**Secondary Timing Advance Group**: As defined in TS 36.331 [2].

**SSB:** SS/PBCH block as defined in TS 38.211 [42, section 7.4.3].

**sTTI** : A transmission time interval (TTI) of either one slot or one subslot transmission duration as defined in TS 36.211 [16] on either uplink or downlink.

**Synchronous Dual Connectivity:** As defined in TS 36.331 [2].

**TDD-FDD carrier aggregation:** Carrier aggregation of component carriers in E-UTRA TDD and E-UTRA FDD operating bands TS 36.104 [30].

**Timing Advance Group**: As defined in TS 36.331 [2].

**WLAN RSSI:** As defined in TS36.214 [4].

**x_RA**: x-to-RS EPRE ratio for the channel or physical signal x in all transmitted OFDM symbols not containing RS.

**x_RB**: x-to-RS EPRE ratio for the channel or physical signal x in all transmitted OFDM symbols containing RS.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

| | |
|---|---|
| […] | Values included in square bracket must be considered for further studies, because it means that a decision about that value was not taken. |
| $BW_{Channel}$ | Channel bandwidth, defined in TS 36.101 subclause 3.2 |
| CPICH_Ec | Average energy per PN chip for the CPICH |
| CPICH_Ec/Io | The ratio of the received energy per PN chip for the CPICH to the total received power spectral density at the UE antenna connector. |
| Ec | Average energy per PN chip. |
| Ês | Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector |
| Io | The total received power density, including signal and interference, as measured at the UE antenna connector. |
| Ioc | The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector. |
| Iot | The received power spectral density of the total noise and interference for a certain RE (power integrated over the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector |
| NSCH_RP | Received (linear) average power of the resource elements that carry Narrowband synchronisation signal, measured at the UE antenna connector |
| $N_{oc}$ | The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector |
| $N_{PRS}$ | Number of consecutive downlink positioning subframes as defined in clause 6.10.4.3 in TS 36.211 |
| $n_{PRB}$ | Physical Resource Block number as defined in clause 3.1 in TS 36.211. |
| $N_{\mathrm{TA}}$ | Timing offset between uplink and downlink radio frames at the UE, as defined in clause 3.1 in TS 36.211. |
| $N_{\mathrm{TA\ offset}}$ | Fixed timing advance offset, as defined in clause 3.1 in TS 36.211. |
| $P_{\mathrm{CMAX}}$ | Configured UE transmitted power as defined in clause 6.2.5 in TS 36.101. |
| $P_{\mathrm{CMAX}_c}$ | Configured UE transmitted power on a serving cell *c* as defined in clause 6.2.5A in TS 36.101. |

PRP Received (linear) average power of the resource elements that carry E-UTRA PRS, measured at the UE antenna connector.
S Cell Selection Criterion defined in TS 36.304, subclause 5.2.3.2 for E-UTRAN
SCH_Ec/Ior The ratio of the transmit energy per PN chip of the SCH to the total transmit power spectral density at the UTRA Node B antenna connector
SCH_RP Received (linear) average power of the resource elements that carry E-UTRA synchronisation signal, measured at the UE antenna connector
Srxlev Cell selection RX level, defined in TS 36.304, subclause 5.2.3.2
Squal Cell selection quality, defined in TS 36.304, subclause 5.2.3.2
Sintersearch Defined in TS 25.304, subclause 5.2.6.1.5
Sintrasearch Defined in TS 25.304, subclause 5.2.6.1.5 for UTRAN and in TS 36.304 , subclause 5.2.4.7 for E-UTRAN
Snonintrasearch Defined in TS 36.304 , subclause 5.2.4.7
SsearchRAT Defined in TS 25.304, subclause 5.2.6.1.5
$Thresh_{x, high}$ Defined in TS 36.304 , subclause 5.2.4.7
$Thresh_{x, low}$ Defined in TS 36.304 , subclause 5.2.4.7
$Thresh_{serving, low}$ Defined in TS 36.304 , subclause 5.2.4.7
$T_{PRS}$ Cell-specific positioning subframe configuration period as defined in clause 6.10.4.3 in TS 36.211
$T_{RE-ESTABLISH-REQ}$ The RRC Re-establishment delay requirement, the time between the moment when erroneous CRCs are applied, to when the UE starts to send preambles on the PRACH.
Treselection Defined in TS 25.304, subclause 5.2.6.1.5
$Treselection_{RAT}$ Defined in TS 36.304 , subclause 5.2.4.7
$Treselection_{EUTRA}$ Defined in TS 36.304 , subclause 5.2.4.7
$Treselection_{UTRA}$ Defined in TS 36.304 , subclause 5.2.4.7
$Treselection_{GERA}$ Defined in TS 36.304 , subclause 5.2.4.7
$T_s$ Basic time unit, defined in TS 36.211, clause 4
$T_c$ Reference time unit, defined in TS 38.211, subclause 4.1

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [26] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [26].

1x RTT CDMA2000 1x Radio Transmission Technology
ABS Almost Blank Subframe
ARQ Automatic Repeat Request
AP Access Point
AWGN Additive White Gaussian Noise
BCCH Broadcast Control Channel
BCH Broadcast Channel
CA Carrier Aggregation
CC Component Carrier
CCA Clear Channel Assessment
CCCH SDU Common Control Channel SDU
CE Coverage Enhancement
CGI Cell Global Identifier
CPICH Common Pilot Channel
CPICH Ec/No CPICH Received energy per chip divided by the power density in the band
CRS Cell-specific Reference Signals
C-RNTI Cell RNTI
CSI Channel-State Information
CSI-RS CSI Reference Signal
DAPS Dual Active Protocol Stack
DC Dual Connectivity
DCCH Dedicated Control Channel
DL Downlink
DMTC Discovery signal Measurement Timing Configuration
DRX Discontinuous Reception
DTCH Dedicated Traffic Channel

| | |
|---|---|
| DUT | Device Under Test |
| E-CID | Enhanced Cell-ID (positioning method) |
| ECGI | Evolved CGI |
| eDRX_IDLE | Extended IDLE-mode DRX |
| eDRX_CONN | Extended CONNECTED-mode DRX |
| eNB | E-UTRAN NodeB |
| EN-DC | E-UTRA-NR Dual Connectivity |
| E-SMLC | Enhanced Serving Mobile Location Centre |
| E-UTRA | Evolved UTRA |
| E-UTRAN | Evolved UTRAN |
| FDD | Frequency Division Duplex |
| FS3 | Frame Structure type 3 |
| GERAN | GSM EDGE Radio Access Network |
| GNSS | Global Navigational Satellite System |
| GSM | Global System for Mobile communication |
| HARQ | Hybrid Automatic Repeat Request |
| HD-FDD | Half-Duplex FDD |
| HO | Handover |
| HRPD | High Rate Packet Data |
| IDC | In-Device Coexistence |
| IEEE | Institute of Electrical and Electronics Engineers |
| LBT | Listen before talk |
| LPP | LTE Positioning Protocol |
| LWA | LTE-WLAN Aggregation |
| MAC | Medium Access Control |
| MCG | Master Cell Group |
| MeNB | Master eNB |
| MBMS | Multimedia Broadcast Multicast Service |
| MBSFN | Multimedia Broadcast multicast service Single Frequency Network |
| MBSFN ABS | MBSFN Almost Blank Subframe |
| MDT | Minimization of Drive Tests |
| MGRP | Measurement Gap Repetition Period |
| MIB | Master Information Block |
| MPDCCH | MTC Physical Downlink Control Channel |
| NCSG | Network Controlled Small Gap |
| NE-DC | NR-E-UTRA Dual Connectivity |
| NG-RAN | NG Radio Access Network |
| NGEN-DC | NG-RAN E-UTRA-NR Dual Connectivity |
| NR | New Radio |
| NSA | Non-standalone |
| NPBCH | Narrowband Physical Broadcast CHannel |
| NPDCCH | Narrowband Physical Downlink Control CHannel |
| NPDSCH | Narrowband Physical Downlink Shared CHannel |
| NPRACH | Narrowband Physical Random Access CHannel |
| NPUSCH | Narrowband Physical Uplink Shared CHannel |
| NPSS | Narrowband Primary Synchronization Signal |
| NRS | Narrowband Refernce Signal |
| NRSRP | Narrowband Reference Signal Received Power |
| NRSRQ | Narrowband Reference Signal Received Quality |
| NSCH | Narrowband Synchronization Channel |
| NSSS | Narrowband Secondary Synchronization Signal |
| OCNG | OFDMA Channel Noise Generator |
| OFDM | Orthogonal Frequency Division Multiplexing |
| OFDMA | Orthogonal Frequency Division Multiple Access |
| OTDOA | Observed Time Difference of Arrival |
| PBCH | Physical Broadcast Channel |
| PCC | Primary Component Carrier |
| P-CCPCH | Primary Common Control Physical Channel |
| PCell | Primary Cell |
| PCFICH | Physical Control Format Indicator CHannel |
| PDCCH | Physical Downlink Control CHannel |
| PDSCH | Physical Downlink Shared CHannel |

| | |
|---|---|
| PHICH | Physical Hybrid-ARQ Indicator CHannel |
| PLMN | Public Land Mobile Network |
| PMCH | Physical Multicast Channel |
| PRACH | Physical Random Access CHannel |
| ProSe | Proximity-based Services |
| PRS | Positioning Reference Signal |
| PSBCH | Physical Sidelink Broadcast CHannel |
| PSCCH | Physical Sidelink Control Channel |
| PSCell | Primary SCell |
| PSS | Primary Synchronization Signal |
| PSSCH | Physical Sidelink Shared CHannel |
| psTAG | Primary Secondary Timing Advance Group |
| pTAG | Primary Timing Advance Group |
| PTW | Paging Time Window |
| PUCCH | Physical Uplink Control CHannel |
| PUSCH | Physical Uplink Shared Channel |
| RS-SINR | Reference Signal Signal to Noise and Interference Ratio |
| RSCP | Received Signal Code Power |
| RSRP | Reference Signal Received Power |
| RSRQ | Reference Signal Received Quality |
| RSSI | Received Signal Strength Indicator |
| RSTD | Reference Signal Time Difference |
| QAM | Quadrature Amplitude Modulation |
| RACH | Random Access Channel |
| RAT | Radio Access Technology |
| RNC | Radio Network Controller |
| RNTI | Radio Network Temporary Identifier |
| RRC | Radio Resource Control |
| RRM | Radio Resource Management |
| RSS | Resynchronization Signal |
| SCC | Secondary Component Carrier |
| SCE | Small Cell Enhancement |
| SCH | Synchronization Channel |
| SCell | Secondary Cell |
| SCG | Secondary Cell GroupSDU Service Data Unit |
| SCS | Subcarrier spacing |
| SeNB | Secondary eNB |
| SFN | System Frame Number |
| SI | System Information |
| SIB | System Information Block |
| SLSS | SideLink Synchronization Sequence |
| SON | Self Optimized Network |
| SPDCCH | Short Physical Downlink Control channel |
| SPUCCH | Short Physical Uplink Control channel |
| SRS | Sounding Reference Signal |
| SS-RSRP | Synchronization Signal based Reference Signal Received Power |
| SS-RSRQ | Synchronization Signal based Reference Signal Received Quality |
| SS-SINR | Synchronization Signal based Signal to Noise and Interference Ratio |
| SSB | Synchronization Signal Block |
| SSS | Secondary Synchronization Signal |
| SSTD | SFN and subframe time difference |
| sTAG | Secondary Timing Advance Group |
| TAG | Timing Advance Group |
| TDD | Time Division Duplex |
| TP | Transmission Point |
| TTI | Transmission Time Interval |
| UE | User Equipment |
| UL | Uplink |
| UMTS | Universal Mobile Telecommunication System |
| UTRA | Universal Terrestrial Radio Access |
| UTRAN | Universal Terrestrial Radio Access Network |
| V2V | Vehicle to Vehicle |

V2X Vehicle to Everything
WLAN Wireless Local Area Network
WB-RSRQ Wide Bandwith RSRQ

# 3.4 Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. The test specification 36.521-3 [23] defines the test tolerances. These test tolerances are individually calculated for each test. The test tolerances are then added to the limits in this specification to create test limits. The measurement results are compared against the test limits as defined by the shared risk principle.

Shared Risk is defined in [ETR 273 Part 1 sub-part 2 clause 6.5].

# 3.5 Additional notation

## 3.5.1 Groups of bands

The intention with the band grouping below is to increase the readability of the specification.

**Table 3.5.1-1: E-UTRA band groups**

| Group | E-UTRA FDD | | E-UTRA TDD | | E-UTRA Frame Structure 3 | |
|---|---|---|---|---|---|---|
| | Band group notation | Operating bands | Band group notation | Operating bands | Band group notation | Operating bands |
| A | FDD_A | 1, 4, 6, 10, 11, 18, 19, 21, 23, 24, 32 Note 2, 67Note 2, 69Note 2, 70Note 7, 75 Note 2, 76 Note 2 | TDD_A | 33, 34, 35, 36, 37, 38, 39, 40, 45, 50, 51, 53 | FS3_A | - |
| B | FDD_B1 | 65, 66 Note 5 | TDD_B | - | FS3_B | - |
| | FDD_B2 | 74Note 8 | | | | |
| C | FDD_C | 9, 30 | TDD_C | 42, 43, 48, 52 | FS3_C | - |
| D | FDD_D | 28, 68 | TDD_D | - | FS3_D | - |
| E | FDD_E | 2, 5, 7, 27 | TDD_E | 41, 44 | FS3_E | - |
| F | FDD_F | 26 Note 3 | TDD_F | - | FS3_F | - |
| G | FDD_G | 3, 8, 12, 13, 14, 17, 20, 22, 29 Note 2, 71, 85 | TDD_G | 47 Note4 | FS3_G | 46 Note 2, 49 Note 2 |
| H | FDD_H | 25 | TDD_H | - | FS3_H | - |
| I | FDD_I | - | TDD_I | - | FS3_I | - |
| J | FDD_J | - | TDD_J | - | FS3_J | - |
| K | FDD_K | - | TDD_K | - | FS3_K | - |
| L | FDD_L | - | TDD_L | - | FS3_L | - |
| M | FDD_M | - | TDD_M | - | FS3_M | - |
| N | FDD_N | 31, 72, 73, 87, 88 | TDD_N | - | FS3_N | - |

NOTE 1: The bands within the same group have the same Io conditions in a corresponding requirement in this specification.
NOTE 2: This band is used only for E-UTRA carrier aggregation with other E-UTRA bands.
NOTE 3: The minimum Io condition for Band 26 is reduced by 0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 4: This band is used only for V2V operation.
NOTE 5: The range 2180-2200 MHz of the DL operating band 66 is restricted to E-UTRA operation when carrier aggregation is configured.
NOTE 6: Void
NOTE 7: The range 2010-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 300 MHz The range 2005-2020 MHz of the DL operating band is restricted to E-UTRA operation when carrier aggregation is configured and TX-RX separation is 295 MHz
NOTE 8: The minimum Io condition for Band 74 is reduced by 0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 1475.9-1510.9 MHz.

**Table 3.5.1-2: Band groups for NB-IoT**

| Group | E-UTRA/NR FDD | E-UTRA/NR TDD |
|---|---|---|

| | Band group notation | Operating bands | Band group notation | Operating bands |
|---|---|---|---|---|
| A | NFDD_A | - | NTDD_A | - |
| B | NFDD_B | - | NTDD_B | - |
| C | NFDD_C | - | NTDD_C | - |
| D | NFDD_D | - | NTDD_D | - |
| E | NFDD_E | - | NTDD_E | - |
| F | NFDD_F | - | NTDD_F | - |
| G | NFDD_G | 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 21, 25, 26, 28, 31, 65, 66, 70, 71, 72, 73, 74, 85, 87, 88, n1, n2, n3, n5, n7, n8, n12, n14, n18, n20, n25, n28, n65, n66, n70, n71, n74 | NTDD_G | 41, 42, 43, n41, n90 |
| H | NFDD_H | - | NTDD_H | - |
| I | NFDD_I | - | NTDD_I | - |
| J | NFDD_J | - | NTDD_J | - |
| K | NFDD_K | - | NTDD_K | - |
| L | NFDD_L | - | NTDD_L | - |
| M | NFDD_M | - | NTDD_M | - |
| N | NFDD_N | - | NTDD_N | - |

**Table 3.5.1-3: Band groups for Category 0**

| Group | E-UTRA FDD | | E-UTRA TDD | |
|---|---|---|---|---|
| | Band group notation | Operating bands | Band group notation | Operating bands |
| A | FDD-0_A | 4 | TDD-0_A | 39 |
| B | FDD-0_B | - | TDD-0_B | - |
| C | FDD-0_C | - | TDD-0_C | - |
| D | FDD-0_D | - | TDD-0_D | - |
| E | FDD-0_E | 2, 5 | TDD-0_E | 41 |
| F | FDD-0_F | 26 Note 1 | TDD-0_F | - |
| G | FDD-0_G | 3, 8, 13, 20 | TDD-0_G | - |
| H | FDD-0_H | 25 | TDD-0_H | - |
| I | FDD-0_I | - | TDD-0_I | - |
| J | FDD-0_J | - | TDD-0_J | - |
| K | FDD-0_K | - | TDD-0_K | - |
| L | FDD-0_L | - | TDD-0_L | - |
| M | FDD-0_M | - | TDD-0_M | - |
| N | FDD-0_N | - | TDD-0_N | - |
| NOTE 1: The minimum Io condition for Band 26 is reduced by 0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | | |

**Table 3.5.1-4: Band groups for Category M1**

| Group | E-UTRA FDD | | E-UTRA TDD | |
|---|---|---|---|---|
| | Band group notation | Operating bands | Band group notation | Operating bands |
| A | FDD-M1_A | 1, 4, 11, 18, 19, 21 | TDD-M1_A | 39, 40 |
| B | FDD-M1_B | 66 Note 2, 74 Note 3 | TDD-M1_B | - |
| C | FDD-M1_C | - | TDD-M1_C | - |
| D | FDD-M1_D | 28 | TDD-M1_D | - |
| E | FDD-M1_E | 2, 5, 7, 27 | TDD-M1_E | 41, 42, 43 |
| F | FDD-M1_F | 26 Note 1 | TDD-M1_F | - |
| G | FDD-M1_G | 3, 8, 12, 13, 20, 85 | TDD-M1_G | - |
| H | FDD-M1_H | 25 | TDD-M1_H | - |
| I | FDD-M1_I | - | TDD-M1_I | - |
| J | FDD-M1_J | - | TDD-M1_J | - |
| K | FDD-M1_K | - | TDD-M1_K | - |
| L | FDD-M1_L | - | TDD-M1_L | - |

| | | | | |
|---|---|---|---|---|
| M | FDD-M1_M | - | TDD-M1_M | - |
| N | FDD-M1_N | 31, 72, 73, 87, 88 | TDD-M1_N | - |
| NOTE 1: The minimum Io condition for Band 26 is reduced by 0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | | |
| NOTE 2: The range 2180-2200 MHz of the DL operating band 66 is restricted to E-UTRA operation when carrier aggregation is configured. | | | | |
| NOTE 3: The minimum Io condition for Band 74 is reduced by 0.5 dB when the carrier frequency of the assigned E-UTRA channel bandwidth is within 1475.9-1510.9 MHz. | | | | |

# 3.6 General

## 3.6.1 Applicability of requirements in this specification version

In this specification,

- 'cell', 'PCell', 'PSCell' and 'SCell' refer to E-UTRA cell, E-UTRA PCell, E-UTRA PSCell and E-UTRA SCell, respectively,
- NR cells are referred to as 'NR cell', 'NR PCell', 'NR PSCell' and 'NR SCell',
- 'dual connectivity' refers to Intra-E-UTRA dual connectivity,
- E-UTRA-NR dual connectivity or EN-DC refer to when E-UTRA is the master,
- NR-E-UTRA dual connectivity or NE-DC refer to when NR is the master.

- The requirements for TDD-FDD carrier aggregation are specified for two downlink and one uplink component carriers. The requirements are specified for both cases when the PCell belongs to TDD or FDD.
- All the requirements for intra-band contiguous and non-contiguous CA apply under the assumption of the same uplink-downlink and special subframe configurations [16] in the PCell and SCell.
- All the requirements for inter-band CA apply for the same uplink-downlink and special subframe configurations [16] in the PCell and SCell. Different uplink-downlink and special subframe configurations [16] in the PCell and SCell are supported for inter-band CA for UEs which:
  - do not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and
  - are compliant to the requirements specified in TS 36.101 for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx.
- All the inter-frequency requirements and requirements for measurements on deactivated carrier apply for the same uplink-downlink and special subframe configurations [16] in the PCell and SCell. Different uplink-downlink and special subframe configurations [16] in the PCell and SCell are supported for inter-frequency for UEs which:
  - do not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and are compliant to the requirements specified in TS 36.101 for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx.
- Requirements for E-UTRA carrier aggregation are applicable for the CA capable UE which has been configured with at least one downlink SCell, but:
  - up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to four downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or
  - up to five downlink CCs and up to two uplink CCs for intra-band contiguous carrier aggregation, or
  - up to four downlink CCs and one uplink CCs for inter-band carrier aggregation, or

- up to two downlink/uplink CCs intra-band contiguous and one downlink/uplink inter-band carrier aggregation, or
- up to two downlink CCs intra-band contiguous and up to three downlink inter-bands and up to two uplink CCs for inter-band carrier aggregation, or
- up to two downlink CCs intra-band non-contiguous and up to three downlink inter-bands and up to two uplink CCs for inter-band carrier aggregation, or
- up to three downlink CCs intra-band contiguous and one downlink intra-band non-contiguous and up to two uplink CCs intra-band contiguous for carrier aggregation, or
- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous per sub-blocks and up to two uplink CCs intra-band contiguous for carrier aggregation, or
- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous and three downlink CCs intra-band contiguous per sub-block and up to two uplink CCs intra-band contiguous for carrier aggregation, or
- two downlink CCs intra-band contiguous and three down link CCs inter-band and one uplink CC for carrier aggregation, or
- two downlink CCs intra-band contiguous and two downlink CCs intra-band contiguous and one downlink CC inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs and up to two uplink CCs for intra-band non-contiguous carrier aggregation, or
- up to two downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or
- up to two downlink CCs intra-band contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs intra-band non-contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs and one uplink CC for intra-band non-contiguous carrier aggregation.

- Requirements for E-UTRA carrier aggregation for discovery signal measurements are applicable for CA capable UE which has been configured with at least one downlink SCell, but:
  - up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to four downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or
  - up to five downlink CCs and up to two uplink CCs for intra-band contiguous carrier aggregation, or
  - up to four downlink CCs and up to one uplink CCs for inter-band carrier aggregation, or
  - up to two downlink/uplink CCs intra-band contiguous and one downlink/uplink inter-band carrier aggregation, or
  - up to two downlink CCs intra-band contiguous and up to three downlink inter-band and up to two uplink CCs for inter-band carrier aggregation, or
  - up to two downlink CCs intra-band non-contiguous and up to three downlink inter-band and up to two uplink CCs for inter-band carrier aggregation, or
  - up to three downlink CCs intra-band contiguous and one downlink intra-band non-contiguous and up to two uplink CCs intra-band contiguous for carrier aggregation, or
  - two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous per sub-blocks and up to two uplink CCs intra-band contiguous for carrier aggregation, or

- two sub-blocks intra-band non-contiguous with two downlink CCs intra-band contiguous and three downlink CCs intra-band contiguous per sub-block and up to two uplink CCs intra-band contiguous for carrier aggregation, or
- two downlink CCs intra-band contiguous and three down link CCs inter-band and one uplink CC for carrier aggregation, or
- two downlink CCs intra-band contiguous and two downlink CCs intra-band contiguous and one downlink CC inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs and up to two uplink CCs for intra-band non-contiguous carrier aggregation, or
- up to two downlink CCs and up to two uplink CCs for inter-band carrier aggregation, or
- up to two downlink CCs intra-band contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs intra-band non-contiguous and one downlink inter-band and one uplink CC for carrier aggregation, or
- up to two downlink CCs and one uplink CC for intra-band non-contiguous carrier aggregation.

- Requirements for E-UTRA carrier aggregation, where the PCell is FDD PCell or TDD PCell and at least one downlink SCell follows the frame structure 3 and no UL SCell following the frame structure type 3 [16], are applicable for the CA capable UE, which has been configured with at least one downlink SCell but:
  - up to four downlink CCs intra-band contiguous and up to three downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to three downlink CCs intra-band contiguous and up to four downlink CCs inter-band and one uplink CC for carrier aggregation, or
  - up to five downlink CCs and up to two uplink CCs for inter-band carrier aggregation.
- Requirements for E-UTRA carrier aggregation, where the PCell is FDD PCell or TDD PCell, and at least one downlink SCell and one uplink SCell follow the frame structure type 3 [16], are applicable for the CA capable UE, which has been configured with at least one downlink SCell and at least one uplink SCell but:
  - up to five downlink CCs and two uplink CCs for inter-band carrier aggregation.
- The requirements for UE configured with eDRX_CONN cycle do not apply for CA requirements and dual connectivity requirements.
- The requirements for a UE category 0 are derived assuming UE category 0 [31] and a single antenna receiver.
- The requirements for UE category M1 are derived assuming: DL Category M1 and Uplink Category M1, operation in any LTE system bandwidth but with a channel bandwidth of 1.4 MHz and transmission bandwidth of 6 PRBs in downlink and uplink, and a single antenna receiver. DL UE category M1 and UL UE category M1 are defined in TS 36.306 [31].
- The requirements for normal coverage in idle mode shall apply provided the UE category M1 is with the radio condition that SCH $\hat{E}s/Iot \geq -6$ dB and CRS $\hat{E}s/Iot \geq -6$ dB.
- The requirements for enhanced coverage in idle mode shall apply provided the UE category M1 is capable of ce-ModeB [2] and is with the radio condition that SCH $\hat{E}s/Iot \geq -15$ dB and CRS $\hat{E}s/Iot \geq -15$ dB.
- The requirements for CEMode A shall apply provided the UE category M1 is configured with CEMode A, SCH $\hat{E}s/Iot \geq -6$ dB and CRS $\hat{E}s/Iot \geq -6$ dB. The CEMode A and the number of repetition levels for different physical channels are defined in TS 36.213 [3].
- The requirements for CEMode B shall apply provided the UE category M1 is configured with CEMode B, SCH $\hat{E}s/Iot \geq -15$ dB and CRS $\hat{E}s/Iot \geq -15$ dB. The CEMode B and the number of repetition levels for different physical channels are defined in TS 36.213 [3].
- The requirements for CEMode B shall apply provided the UE category M1 is configured with CEMode A and capable of ce-ModeB [2], $-15$ dB $\leq$ SCH $\hat{E}s/Iot \leq -6$ dB and $-15$ dB $\leq$ CRS $\hat{E}s/Iot \leq -6$ dB.

- The requirement for UE category M2 are derived assuming downlink category M2 and uplink category M2, operation in any LTE system bandwidth but with a channel bandwidth not exceeding 5MHz, transmission bandwidth not exceeding 24RB in downlink and 5MHz in uplink, and a single antenna receiver. DL UE category M2 and UL UE category M2 are defined in TS 36.306 [31].

- The requirements for normal coverage in idle mode shall apply provided the UE category M2 is with the radio condition that SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB.

- The requirements for enhanced coverage in idle mode shall apply provided the UE category M2 is capable of ce-ModeB [2] and is with the radio condition that SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB.

- The requirements for CEMode A shall apply provided the UE category M2 is configured with CEMode A, SCH Ês/Iot ≥ -6 dB and CRS Ês/Iot ≥ -6 dB. The CEMode A and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M2 is configured with CEMode B, SCH Ês/Iot ≥ -15 dB and CRS Ês/Iot ≥ -15 dB. The CEMode B and the number of repetition levels for different physical channels are defined in TS 36.213 [3].

- The requirements for CEMode B shall apply provided the UE category M2 is configured with CEMode A and capable of ce-ModeB [2], -15 dB ≤ SCH Ês/Iot ≤ -6 dB and -15 dB ≤ CRS Ês/Iot ≤ -6 dB.

- Unless explicitly defined the following additional requirements are applicable to UE category M2:

  - Cell Selection and Re-selection Requirements in section 4.7

  - Handover requirements in section 5.5 and 5.6

  - Random access requirements in section 6.2.3

  - RRC re-establishment requirements in section 6.7

  - RRC connection release with redirection requirements in section 6.8

  - Radio Link monitoring requreiements in section 7.19

  - Timing advance requirements in section 7.28

  - UE timer accuracy requirement in section 7.27

  - E-UTRAN intra frequency measurement requirements in section 8.13.2.1 and 8.13.3.1

  - E-UTRAN inter frequency measurement requirements in section 8.13.2.6 and 8.13.3.5

  - UE measurement capability in section 8.13.2.7 and 8.13.3.6

  - E-UTRAN E-CID measurements requirements in section 8.13.2.5.1, 8.13.2.5.2, 8.13.2.5.3, 8.13.2.5.4, 8.13.2.5.5, 8.13.2.5.6 and 8.13.3.4

  - Measurement accuracy requirements in section 9.1.21.1 to 9.1.21.16.

- The requirements for non-BL CE UE are derived assuming: DL and UL category other than Category 0/M1/M2/NB1/NB2, operation in any LTE system bandwidth but with a channel bandwidth not exceeding 20MHz, transmission bandwidth not exceeding 96RB in downlink and 5MHz in uplink, and dual antenna receiver, when in RRC_IDLE mode camped on a cell acquired using SIB1-BR, or in RRC_CONNECTED configured with CE mode A/B. Non-BL CE UE is defined in [31].

- The Cat-M2 UE requirements for normal coverage in idle mode shall apply provided the UE is non-BL CE and with the radio condition that the serving cell SCH Ês/Iot ≥ -6dB and CRS Ês/Iot ≥ -6 dB, unless corresponding individual non-BL CE requirements are specified.

- The Cat-M2 UE requirements for enhanced coverage in idle mode shall apply provided the UE is non-BL CE capable of ce-ModeB [2] and with the radio condition that the serving cell -6dB ≥ SCH Ês/Iot ≥ -15dB and -6dB ≥ CRS Ês/Iot ≥ -15 dB, unless corresponding individual non-BL CE requirements are specified.

- The Cat-M2 UE requirements for CEMode A shall apply provided the UE is non-BL CE and is configured with CEModeA, the serving cell SCH $\hat{E}s/Iot \geq -6$ dB and CRS $\hat{E}s/Iot \geq -6$ dB, unless corresponding individual non-BL CE requirements are specified. The CEMode A and the number of repetition levels for different physical channels are defined in [3].

- The Cat-M2 UE requirements for CEMode B shall apply provided the UE is non-BL CE and is configured with CEMode B, the serving cell SCH $\hat{E}s/Iot \geq -15$ dB and CRS $\hat{E}s/Iot \geq -15$ dB, unless corresponding individual non-BL CE requirements are specified. The CEMode B and the number of repetition levels for different physical channels are defined in [3].

- Unless explicitly defined the following additional requirements are applicable to non-BL CE UE:

  - Cell Selection and Re-selection Requirements in section 4.7

  - Handover requirements in section 5.5 and 5.6

  - Random access requirements in section 6.2.3

  - RRC re-establishment requirements in section 6.7

  - RRC connection release with redirection requirements in section 6.8

  - UE transmit timing requirements in section 7.26

  - Radio Link monitoring requreiements in section 7.19

  - Timing advance requirements in section 7.28

  - UE timer accuracy requirement in section 7.27

  - E-UTRAN intra frequency measurement requirements in section 8.13.2.1 and 8.13.3.1.1, 8.13.3.1.2, and 8.13.3.1.3

  - E-UTRAN inter frequency measurement requirements in section 8.13.2.6 and 8.13.3.5

  - UE measurement capability in section 8.13.2.7 and 8.13.3.6

  - E-UTRAN E-CID measurements requirements in section 8.13.2.5.1, 8.13.2.5.2, 8.13.2.5.3, 8.13.2.5.4, 8.13.2.5.5, 8.13.2.5.6, 8.16.2.1, 8.16.2.2, 8.16.2.2a and 8.13.3.4

  - E-UTRAN OTDOA RSTD measurements requirements in section 8.16.2.3, 8.16.2.4, 8.16.3.1 and 8.16.3.2 except those requiring any of the measurement gap pattern in Table 8.1.2.1-3.

  - Measurement accuracy requirements in section 9.1.25

  - Measurement accuracy requirements in section 9.1.21 if the UE is of category 1bis.

- Requirements for E-UTRA ProSe Direct Discovery and E-UTRA ProSe Direct Communication are applicable for ProSe operation on either the uplink frequency of PCC, or SCC, or a non-serving carrier, but:

  - with ProSe operation limited to one carrier on a given subframe.

- Requirements for interruptions due to ProSe Direct Discovery and/or ProSe Direct Communications specified in clause 7.16.3 apply, but:

  - with configured serving carriers of up to two downlink CCs, unless the UE is configured with reception gap for ProSe operation, and

  - with configured serving carriers of up to two uplink CCs, unless the UE is configured with transmission gap for ProSe operation.

- The requirements for UE category NB1 are derived assuming UE category NB1and a single antenna receiver. UE category NB1 is defined in TS 36.306 [31].

- The requirements for normal coverage shall apply for UE category NB1 provided that the radio condition of its serving cell are: NSCH $\hat{E}s/Iot \geq -6$ dB and NRS $\hat{E}s/Iot \geq -6$ dB.

- The requirements for enhanced coverage shall apply for UE category NB1 provided that the radio condition of its serving cell are: -15 dB ≤ NSCH Ês/Iot < -6 dB and -15 dB ≤ NRS Ês/Iot < -6 dB.
- The measurement accuracy requirements in section 9.1.22 for intra-frequency and inter-frequency absolute NRSRQ accuracy for UE Category NB1 apply only in idle mode.
- The measurement accuracy requirements in section 9.1.22 for intra-frequency absolute NRSRP accuracy for UE Category NB1 apply in idle and connected mode.
- The measurement accuracy requirements in section 9.1.22 for inter-frequency absolute NRSRP accuracy for UE Category NB1 apply only in idle mode.
- The requirements for SRS carrier based switching shall apply when the UE capable of SRS carrier based switching is configured to perform SRS carrier based switching for transmitting SRS and/or RACH in one or more CCs in the same or different time resources.
- The requirements for a UE category 1bis are derived assuming UE category 1bis [31] and a single antenna receiver. Following requirements are applicable to UE category 1bis.
  - Cell re-selection requirements in section 4.2.2.1 to 4.2.2.10
  - Handover requirements in section 5.1, 5.2, 5.3 and 5.4
  - RRC re-establishment requirements in section 6.1
  - Random access requirements in section 6.2
  - RRC connection release with redirection requirements in section 6.3
  - UE transmit timing requirements in section 7.1
  - UE timer accuracy requirements in section 7.2
  - Timing advance requirements in section 7.3
  - Radio link monitoring requirements in section 7.11
  - UE measurement capability in section 8.1.2.1
  - E-UTRAN intra frequency measurement requirements in section 8.5.2.1.1 and 8.5.2.1.3
  - E-UTRAN inter frequency measurement requirements in section 8.1.2.3.1, 8.1.2.3.2, 8.1.2.3.3 and 8.1.2.3.4
  - Inter RAT measurement requirements in section 8.1.2.4
  - OTDOA Intra-Frequency measurement requirements in section 8.1.2.5.3, 8.1.2.5.4
  - OTDOA Inter-Frequency measurement requirements in section 8.1.2.6.5, 8.1.2.6.6, 8.1.2.6.7 and 8.1.2.6.8
  - E-UTRAN E-CID measurement requirements in section 8.1.2.7
  - CGI reading requirements for UE category 0 in section 8.5.2.1.4 and 8.5.2.1.6
  - Intra-frequency RSRP Accuracy Requirements in section 9.1.2.7 and 9.1.2.8
  - Inter-frequency RSRP Accuracy Requirements in section 9.1.3.3 and 9.1.3.4
  - Intra-frequency RSRQ Accuracy Requirements in section 9.1.5.5
  - Inter-frequency RSRQ Accuracy Requirements in section 9.1.6.5 and 9.1.6.6
  - RSTD Intra-Frequency Accuracy Requirement in section 9.1.10.5
  - RSTD Inter-Frequency Accuracy Requirement in section 9.1.10.6
  - UE Rx – Tx time difference measurement accuracy requirements in section 9.1.9.1 and 9.1.9.2

- The requirements for UE category NB2 are derived assuming UE category NB2 and a single antenna receiver. UE category NB2 is defined in TS 36.306 [31]. Following requirements are applicable to UE category NB2.
  - Cell selection and re-selection requirements in section 4.6.1 and 4.6.2
  - UE Positioning measurement in idle state in section 4.8
  - RRC Re-establishment requirements in section 6.5
  - Random access requirements in section 6.6
  - RRC connection redirection to non-anchor carrier requirements in section 6.9
  - UE transmit timing requirements in section 7.20
  - UE timer accuracy requirements in section 7.21
  - Timing advance requirements in section 7.22
  - Radio link monitoring requirements in section 7.23
  - UE RRC_CONNECTED state measurement requirement in section 8.14
  - UE measurement accuracy requirements in section 9.1.22
  - Power headroom requirements in section 9.1.23
- All requirements in this specification for UE receiving PMCH in FeMBMS/Unicast-mixed cells apply only for FeMBMS/Unicast-mixed cells configured based on frame structure 1.
- Requirements for E-UTRA carrier aggregation with one or more FeMBMS/Unicast-mixed SCells shall apply, provided the total number of SCCs, including SCCs with FeMBMS/Unicast-mixed SCells, does not exceed the the maximum number of SCCs the UE is capable of.
- Unless explictly stated, requirements related to NR do not apply when CCA is used on serving or neighbour cells.

#### 3.6.1.1 Applicability of requirements for UE capable of network-based CRS interference mitigation

If network-based CRS interference mitigation is enabled in a cell, then the UE capable of network-based CRS interference mitigation [31] can assume the following rules:

- CRS is transmitted over full bandwidth of the cell during active time periods (T1) and over at least 6 central resource blocks of the cell during the inactive time periods (T2), and
- CRS is transmitted over full bandwidth of the cell during at least N1 number of non-MBSFN DL subframes immediately before the T1 time period, and
- CRS is transmitted over full bandwidth of the cell during at least N2 number of DL subframes after the T1 time period when UE receives the downlink physical channel during the T1 time period, and
- CRS is transmitted over full bandwidth of the cell in a subframe which is comprised in any non-zero length T1, N1, or N2, and
- The active time period T1 at least includes any period of the time where
  - UE monitors/receives the downlink physical channels: PDCCH, SPDCCH, EPDCCH, MPDCCH, PDSCH, PMCH, PCFICH, PHICH, or
  - UE receives the downlink physical signals: DM-RS, NZP CSI-RS, MBSFN-RS, and PRS, or
  - UE transmits the uplink physical channels: PUCCH, SPUCCH, PUSCH, and PRACH, or
  - UE transmits the uplink physical signals: DM-RS and SRS.

The values of the parameters T1, T2, N1 and N2 are specified for relevant requirements in their corresponding sections. The inactive time periods T2 shall not contain any subframe where the UE requires CRS over the full cell bandwidth for any purpose to meet the requirements in this specification.

UE can additionally assume the following active time period T1 after the PRACH transmission:

- for UE performing random access, the time from the start of RAR window until MSG2 and MSG4 is received and DRX is configured.
- for UE transmitting PRACH due to handover, the time from the start of RAR window until the handover/RRC connection reconfiguration is complete;
- for UE transmitting a scheduling request over PRACH, the time from the start of RAR window until MSG2 is received.

For a UE capable of supporting dual connectivity and/or carrier aggregation, UE can additionally assume that no inactive time period T2 is present in any of its serving cell(s) in the following period of the time:

- the time from receiving the PSCell addition command until UE starts the PSCell release period,
- the time from receiving of SCell activation command until UE starts the SCell deactivation period,
- the time from receiving of SCell configuration command until UE sends *RRCConnectionReconfigurationComplete*.

For UE in RRC_IDLE and configured with eDRX_IDLE, UE shall assume that inactive time periods T2 comprises any subframe that is outside PTW which is not comprised in the N1 and N2 number of DL subframe before and after any active time period T1 within PTW.

For measurements on neighbor cells that is indicated by the high layer to support the network-based CRS interference mitigation,

- if the UE is configured with *widebandRSRQ-Meas* [2] to measure WB-RSRQ then the UE shall assume that CRS are available in the measured cell over the *AllowedMeasBandwidth* [2],
- otherwise the UE shall assume the *AllowedMeasBandwidth* [2] is 6 RBs and inactive time periods T2 may be used in a neighbor cell.

If network-based CRS interference mitigation is enabled in a cell, all the requirements in this specification shall be met for UE capable of network-based CRS interference mitigation, provided that:

- N1 = 8 and N2 = 1 unless other specified below;
- for UE configured with DRX or eDRX_CONN, the active time periods T1 also includes the periods where no DRX is used (see Section 5 for the definition of the no DRX used state) by the UE, preceeded by N1 and followed by N2;
- for UE operating in HD-FDD mode, provided CRS are available in the concerned cell during UL gaps [16] occurring during the UE's UL transmission, with N1=N2=0 subframes before and after the UL gaps [16] occurring during the UE's UL transmission;
- for UE monitoring or receiving paging, the active time periods T1 also includes all configured paging occasions, with N1 = 8 and N2 = 1 subframes before and after each paging occasion respectively;
- for UE in RRC_IDLE and RRC_CONNECTED and receiving SIB1 or SIB1-BR, the active time periods T1 also includes all subframes with SIB1, where N1 = 8 and N2 = 1 subframes;
- for UE receiving NRS signals [16], provided CRS are available in the concerned cell in all NRS subframes configured for the UE which are comprised in the active time periods T1 within the UE bandwidth;
- for UE monitoring/receiving PRS, the active time periods T1 also includes all PRS subframes, where N2=0 subframes.

### 3.6.1.2 Applicability of requirements with CRS muting for category M1 UE capable of CRS muting

If network has indicated that CRS muting is enabled in a cell using the system information broadcast [2], for a UE capable of supporting CRS muting [31], the CRS is transmitted during the active time periods at the following frequency locations within the cell bandwidth:

- over the 6-PRB bandwidth within the cell bandwidth where the UE reception is configured, and
- 2 additional PRBs where each one is adjacent to the UE configured bandwidth for reception, and
- K number of PRBs within the center of the cell bandwidth indicated by the system information broadcast [2]

During the inactive periods (T2), CRS is transmitted over at least K number of PRBs within center of the cell bandwidth. The UE acquires the values of K from system information broadcast [2] and defined as in Table 3.6.1.2-1.

**Table 3.6.1.2-1: Number of PRBs (K) containing CRS within the center of cell BW**

| crs-IntfMitigNumPRBs [2] | K |
|---|---|
| '0' | 6 PRBs |
| '1' | 24 PRBs |

The UE active period (T1) comprises the time period during which UE is engaged in receiving or monitoring any downlink channel/signal. Otherwise, UE is considered to be in inactive period (T2).

The CRS is transmitted over the 6-PRB bandwidth within the cell bandwidth where the UE reception is configured during at least N1 number of subframes immediately before and N2 number of subframes immediately after the T1 time period, which are excluded for the inactive time periods T2. The values of the parameters T1, T2 and N1 are specified for relevant requirements in their corresponding sections.

For a UE that is not pre-provisioned with EARFCN and geographical information [1, 56],

- CRS is transmitted in 1 subframe every 10 ms or 20 ms over full cell bandwidth if K=6 PRBs or 24 PRBs, respectively, and
- CRS is transmitted at least over the central 6 or 24RBs of the cell bandwidth if K=6 PRBs or 24 PRBs, respectively.

For a UE that is pre-provisioned with EARFCN and geographical information [1, 56],

- CRS is transmitted at least over the central 6 or 24RBs of the cell bandwidth if K=6 PRBs or 24 PRBs, respectively.

For measurements on intra-frequency neighbor cells, if *intraFreqNeighCellMeasCenterPRBs* [2] is enabled then the UE shall assume center 6 PRBs for measurements.

If network has indicated that CRS muting is enabled in a cell using the system information broadcast [2], the requirements for UE category M1 in this specification shall be met

- if CRS is transmitted over the 6-PRB bandwidth within the cell bandwidth where the UE reception is configured in a subframe which is comprised in any non-zero length T1, N1, or N2.
- for UE not configured with DRX or eDRX_CONN, the UE being considered to be always in the active period T1 and the requirements being non-DRX requirements are assumed for the UE.
- for UE configured with DRX or eDRX_CONN, provided the active time periods T1 comprise the periods where the UE is not using DRX, while N1=1 and N2=0 subframe.
- For UE receiving PDSCH receptions, provided CRS are available in the concerned cell in all subframes which are comprised in the active time periods T1, with N1=1, and N2=1 subframe.
- For UE in RRC_IDLE and RRC_CONNECTED and receiving SIB1-BR, provided the active time periods T1 comprise all subframes with SIB1-BR, where N1=1 and N1=8 for UEs which are not capable of supporting CRS muting, and N2=1 subframe.

- For UE receiving random access MSG2 and MSG4, provided the active time period T1 comprises the time from the start of RAR window until MSG2 and MSG4 is received and DRX is configured, where N1=N2=1.

- for UE performing MPDCCH monitoring, provided CRS are available in the concerned cell in all MPDCCH subframes configured for the UE to monitor which are comprised in the active time periods T1, with N1=1 and N2=0 subframes before the MPDCCH subframes.

- for UE operating in HD-FDD mode, provided CRS are available in the concerned cell during UL gaps occurring during UL transmission as defined in TS 36.211 [16], with N1=N2=0 subframes before and after the UL gaps occurring during UL transmission which are comprised in the active time periods T1 within the UE measurement bandwidth;

- provided the UE is configured with measurement gap also for the serving cell measurements according to gap pattern ID # 0 or gap pattern ID # 1 defined in Table 8.1.2.1-1.

### 3.6.1.3 Applicability of requirements with CRS muting for category M2 UE capable of CRS muting

If network has indicated that CRS muting is enabled in a cell using the system information broadcast [2], for a UE capable of supporting CRS muting [31], the CRS is transmitted during the active time periods at the following frequency locations within the cell bandwidth:

- over the 6-PRB or 24-PRB bandwidth within the cell bandwidth where the UE reception is configured, and

- K number of PRBs within the center of the cell bandwidth indicated by the system information broadcast [2], and

- when the UE is configured with downlink bandwidth of 1.4MHz, 2 additional PRBs where each one is adjacent to the 6-PRB bandwidth within the cell bandwidth where UE is configured bandwidth for reception.

During the inactive periods (T2), CRS is transmitted over at least K number of PRBs within center of the cell bandwidth. The UE acquires the values of K from system information broadcast [2] and defined as in Table 3.6.1.3-1.

**Table 3.6.1.3-1: Number of PRBs (K) containing CRS within the center of cell BW**

| crs-IntfMitigNumPRBs [2] | K |
|---|---|
| ‘0’ | 6 PRBs |
| ‘1’ | 24 PRBs |

The UE active period (T1) comprises the time period during which UE is engaged in receiving or monitoring any downlink channel/signal. Otherwise, UE is considered to be in inactive period (T2).

The CRS is transmitted over the 6-PRB or 24-PRB bandwidth within the cell bandwidth where the UE reception is configured during at least N1 number of subframes immediately before and N2 number of subframes immediately after the T1 time period, which are excluded for the inactive time periods T2. The values of the parameters T1, T2 and N1 are specified for relevant requirements in their corresponding sections.

For a UE that is not pre-provisioned with EARFCN and geographical information [1, 56],

- CRS is transmitted in 1 subframe every 10 ms or 20 ms over full cell bandwidth if K=6 PRBs or 24 PRBs, respectively, and

- CRS is transmitted at least over the central 6 or 24RBs of the cell bandwidth if K=6 PRBs or 24 PRBs, respectively.

For a UE that is pre-provisioned with EARFCN and geographical information [1, 56],

- CRS is transmitted at least over the central 6 or 24RBs of the cell bandwidth if K=6 PRBs or 24 PRBs, respectively.

For measurements on intra-frequency neighbor cells, if *intraFreqNeighCellMeasCenterPRBs* [2] is enabled then the UE shall assume center 6 PRBs for measurements.

If network has indicated that CRS muting is enabled in a cell using the system information broadcast [2], for a UE capable of supporting CRS muting and configured with downlink bandwidth of 1.4MHz and K = 6 in Table 3.6.1.3-1,

or for a UE capable of supporting CRS muting and configured with downlink bandwidth of 5MHz and K = 24 in Table 3.6.1.3-1, or for a UE capable of supporting CRS muting and not configured with downlink bandwidth and K = 6 or 24 in Table 3.6.1.3-1, the requirements for UE category M2 in this specification shall be met

- if CRS is transmitted over the 6-PRB or 24-PRB bandwidth within the cell bandwidth where the UE reception is configured in a subframe which is comprised in any non-zero length T1, N1, or N2.
- for UE not configured with DRX or eDRX_CONN, the UE being considered to be always in the active period T1 and the requirements being non-DRX requirements are assumed for the UE.
- for UE configured with DRX or eDRX_CONN, provided the active time periods T1 comprise the periods where the UE is not using DRX, while N1=1 and N2=0 subframe.
- For UE receiving PDSCH receptions, provided CRS are available in the concerned cell in all subframes which are comprised in the active time periods T1, with N1= 1, and N2=1 subframe.
- For UE in RRC_IDLE and RRC_CONNECTED and receiving SIB1-BR, provided the active time periods T1 comprise all subframes with SIB1-BR, where N1=1 and N1=8 for UEs which are not capable of supporting CRS muting, and N2=1 subframe.
- For UE receiving random access MSG2 and MSG4, provided the active time period T1 comprises the time from the start of RAR window until MSG2 and MSG4 is received and DRX is configured, where N1=N2=1.
- for UE performing MPDCCH monitoring, provided CRS are available in the concerned cell in all MPDCCH subframes configured for the UE to monitor which are comprised in the active time periods T1, with N1=1 and N2=0 subframes before the MPDCCH subframes.
- for UE operating in HD-FDD mode, provided CRS are available in the concerned cell during UL gaps occurring during UL transmission as defined in TS 36.211 [16], with N1=N2=0 subframes before and after the UL gaps occurring during UL transmission which are comprised in the active time periods T1 within the UE measurement bandwidth;
- provided the UE is configured with measurement gap also for the serving cell measurements according to gap pattern ID # 0 or gap pattern ID # 1 defined in Table 8.1.2.1-1.

## 3.6.2 Applicability of requirements for EN-DC operation

Requirements for EN-DC operation are applicable for the UE which has been configured with the following number of E-UTRA CCs and NR CCs:

- up to 5 E-UTRA DL CCs in total with 1 E-UTRA UL CC in MCG. The applicable number of NR CC for EN-DC in the SCG is specified in clause 3.6.2 of TS 38.133 [50].

In addition to the requirements explicitly defined for a UE configured with EN-DC the following requirements shall also apply for the UE configured with EN-DC:

- Handover requirements in sections 5.1, 5.3.1, 5.3.2 and 5.3.3,
- RRC Re-establishment requirements in section 6.1,
- Random access requirements in section 6.2,
- RRC connection release with redirection requirements in section 6.3,
- UE transmit timing requirements defined in section 7.1 for UE configured with only pTAG,
- UE timer accuracy requirements in section 7.2,
- Timing advance requirements defined in section 7.3 for 1ms TTI and 4 subframe HARQ processing,
- Radio link monitoring requirements in section 7.6,
- SCell activation and deactivation delay requirements for E-UTRA carrier aggregation defined in section 7.7 for 1ms TTI and 4 subframe HARQ processing except those for CA with frame structure # 3,

- Requirements on received time difference between the PCell and SCell or between SCells defined in sections 7.9 except those defined for CA with frame structure # 3, .
- E-UTRAN intra frequency measurement requirements in section 8.1.2.2, except requirements specified for UE configured with *highSpeedEnhancedMeasFlag*
- E-UTRAN OTDOA intra-frequency RSTD measurements requirements defined in section 8.1.2.5 except those for UE category 1bis,
- E-UTRAN E-CID measurements requirements in section 8.1.2.7,
- Requirements on measurements for E-UTRA carrier aggregation in section 8.3,
- OTDOA RSTD measurement requirements for E-UTRAN carrier aggregation in section 8.4,
- Requirements in Section 9 for intra-frequency RSRP, RSRQ, RS-SINR, and RSTD measurements accuracy for PCell carrier frequency,
- Requirements in Section 9 for inter-frequency RSRP, RSRQ, RS-SINR, and RSTD measurements accuracy for non-serving E-UTRA carrier frequencies,
- Requirements in Section 9 for carrier aggrgation RSRP, RSRQ, RS-SINR, and RSTD measurements accuracy for PCC, SCC, or both,
- Requirements in Section 9 for inter-RAT E-UTRA–UTRA measurements accuracy and inter-RAT E-UTRA–GSM measurements accuracy for UTRA and GSM carriers,
- Power headroom requirements in Section 9 for PSCell and SCell(s).

### 3.6.3 Applicability of requirements for NE-DC operation

Requirements for NE-DC operation are applicable for the UE which has been configured with the following number of E-UTRA CCs and NR CCs:

- up to 5 E-UTRA DL CCs in total with 1 E-UTRA UL CC in SCG. The applicable number of NR CC for EN-DC in the SCG is specified in clause 3.6.2 of TS 38.133 [50].

In addition to the requirements explicitly defined for a UE configured with NE-DC the following requirements shall also apply for the UE configured with NE-DC:

- Random access requirements in section 6.2 for random access procedures on PSCell and activated SCell(s),
- UE transmit timing requirements in section 7.1 for psTAG using PSCell as a reference cell and sTAG(s),
- UE timer accuracy requirements in section 7.2 for UE operation on PSCell and SCell(s),
- Timing advance requirements in section 7.3 for 1ms TTI and 4 subframe HARQ processing,
- Radio link monitoring requirements in section 7.6 for PSCell,
- SCell activation and deactivation delay requirements for E-UTRA carrier aggregation in section 7.7 for 1ms TTI and 4 subframe HARQ processing except those for CA with frame structure # 3,
- E-UTRAN intra-frequency measurement requirements in section 8.1.2.2 for PSCC and SCC, except requirements specified for UE configured with *highSpeedEnhancedMeasFlag,*
- E-UTRAN inter-frequency measurement requirements in section 8.1.2.3 for non-serving E-UTRA carrier frequencies, except requirements specified for UE configured with *highSpeedEnhancedMeasFlag,*
- E-UTRAN E-CID measurements requirements in section 8.19.5 for PSCell and SCell carrier frequencies, and in section 8.19.3 for non-serving E-UTRA carrier frequencies,
- Requirements in Section 9 for intra-frequency RSRP, RSRQ and RS-SINR measurements accuracy on PSCC and SCC,
- Requirements in Section 9 for inter-frequency RSRP, RSRQ and RS-SINR measurements accuracy on non-serving E-UTRA carrier frequencies,

- Power headroom requirements in Section 9 for PSCell and SCell(s).

### 3.6.4 Applicability of requirements for NGEN-DC operation

All the requirements in this specification applicable for EN-DC are also applicable for NGEN-DC.

### 3.6.5 Applicability of 2-step RA and 4-step RA in RRM requirements

Unless explicitly stated otherwise the requirements under the following clauses, where the UE transmits random acess (with requirements in clause 6.2.2 [50]) to NR serving cell or NR target cell, are applicable for both 2-step RA and 4-step RA procedures [39]:

- E-UTRAN - NR FR1 handover requirements in clause 5.3.4,
- E-UTRAN - NR FR2 handover requirements in clause 5.3.5,
- RRC connection release with redirection to NR requirements in clause 6.3.2.4 and
- PSCell addition delay requirements in clause 7.31.2.

Unless explicitly stated otherwise the requirements under the following clauses, where the UE transmits random acess (with requirements in clause 6.2.2A [50]) to NR serving cell or NR target cell subject to uplink CCA, are applicable for both 2-step RA and 4-step RA procedures [39]:

- E-UTRAN - NR FR1 handover requirements with CCA in clause 5.3.4A,
- RRC connection release with redirection to NR requirements with CCA in clause 6.3.2.5 and
- PSCell addition delay requirements with CCA in clause 7.31A.2.

# 4 E-UTRAN RRC_IDLE state mobility

## 4.1 Cell Selection

After a UE has switched on and a PLMN has been selected, the Cell selection process takes place, as described in TS36.304. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

## 4.2 Cell Re-selection

### 4.2.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS36.304, allowing the UE to limit its measurement activity.

### 4.2.2 Requirements

The UE shall search every layer of higher priority at least every $T_{higher_priority_search}$ = (60 * $N_{layers}$) seconds when the UE is not configured with eDRX_IDLE cycle, and at least every $T_{higher_priority_search}$ = MAX(60 * $N_{layers}$, one eDRX_IDLE cycle) when UE is configured with eDRX_IDLE cycle, where $N_{layers}$ is the total number of configured higher priority E-UTRA, UTRA FDD, UTRA TDD, CDMA2000 1x, HRPD and NR carrier frequencies and is additionally increased by one if one or more groups of GSM frequencies is configured as a higher priority.

For a UE configured with early measurement reporting, while T331 is running, $N_{layers}$ is the combined total number of configured higher priority E-UTRA, UTRA FDD, UTRA TDD, CDMA2000 1x, HRPD and NR carrier frequencies and is additionally increased by one if one or more groups of GSM frequencies is configured as a higher priority, and carriers configured for idle mode DC measurements.

Note: combined total number means that if a carrier is a high priority carrier and additionally a carrier configured for idle mode DC measurements, it only counts as one carrier.

In the requirements of Section 4.2.2 for the UE capable of CA, the applicable exceptions for side conditions are specified in Annex B, Section B.4.2.

For a UE which supports increased carrier monitoring E-UTRA or increased carrier monitoring UTRA, the reselection performance for different carriers may be configured by higher layers to be either normal or reduced. The following definitions are used in the requirements:

$K_{carrier}$ : Total number of interfrequency carriers in the neighbour cell list

$K_{carrier,normal} = K_{carrier} - K_{carrier,reduced}$: Number of interfrequency carriers to be monitored in the normal performance group

$K_{carrier,normal,FDD}$ : Number of interfrequency FDD carriers to be monitored in the normal performance group

$K_{carrier,normal,TDD}$ : Number of interfrequency TDD carriers to be monitored in the normal performance group

$K_{carrier,reduced}$ : Number of interfrequency carriers to be monitored in the reduced performance group

$N_{UTRA_carrier}$: Total number of configured UTRA FDD carriers in the neighbour cell list

$N_{UTRA_carrier,normal} = N_{UTRA_carrier} - N_{UTRA_carrier,reduced}$: Number of UTRA FDD carriers to be monitored in the normal performance group

$N_{UTRA_carrier,reduced}$: Number of UTRA FDD carriers to be monitored in the reduced performance group

$N_{UTRA_carrier_TDD}$ : Total number of configured UTRA TDD carriers in the neighbour cell list

$N_{UTRA_carrier_TDD,normal} = N_{UTRA_carrier_TDD} - N_{UTRA_carrier_TDD,reduced}$: Number of UTRA TDD carriers to be monitored in the normal performance grop

$N_{UTRA_carrier_TDD,reduced}$: Number of UTRA TDD carriers to be monitored in the reduced performance group

The minimum performance requirements for a UE which supports Increased UE carrier monitoring E-UTRA [2, 31] are calculated as defined in section 4.2.2.4 provided that $K_{carrier,normal} \leq 3$ for a UE capable of either FDD E-UTRA carrier monitoring or TDD E-UTRA carrier monitoring or $K_{carrier,normal} \leq 6$ for a UE capable of both FDD and TDD E-UTRA carrier monitoring provided $K_{carrier,normal,FDD} \leq 3$ and $K_{carrier,normal,TDD} \leq 3$ and the minimum performance requirements for a UE which supports Increased UE carrier monitoring UTRA [2, 31] are calculated as defined in section 4.2.2.5 provided that $N_{UTRA_carrier_normal} \leq 3$ and $N_{UTRA_carrier_TDD,normal} \leq 3$. In case the limits for the number of normal performance carriers is exceeded considering the broadcast neighbour cell list and the bands supported by the UE, the UE which supports Increased UE carrier monitoring E-UTRA shall measure at least 3 interfrequency carriers with normal performance and the UE which supports Increased UE carrier monitoring UTRA shall measure at least 3 UTRA carriers with normal performance. For a UE capable of monitoring E-UTRAN FDD and TDD carriers, in case the limits for the number of normal performance carriers is exceeded considering the broadcast neighbour cell list and the bands supported by the UE, the UE shall measure at least 3 FDD and 3 TDD E-UTRAN interfrequency carriers with normal performance. Additionally, reduced performance requirements shall be met for carriers for which the *Reduced measurement performance* IE is indicated, up to the UE measurement capability in section 4.2.2.9a.The minimum performance requirements for a UE which does not support Increased UE carrier monitoring E-UTRA [2,31] are calculated assuming all E-UTRA carriers required to be monitored for such UE, are having normal performance and are in normal performance group, i.e. $K_{carrier,normal} = K_{carrier}$ and $K_{carrier,reduced} = 0$. The minimum performance requirements for a UE which does not support Increased UE carrier monitoring UTRA [2,31] are calculated assuming all UTRA carriers required to be monitored for such UE, are having normal performance and are in normal performance group, i.e. $N_{UTRA_carrier,normal} = N_{UTRA_carrier}$, $N_{UTRA_carrier_TDD,normal} = N_{UTRA_carrier_TDD}$ and $N_{UTRA_carrier,reduced} = 0$ and $N_{UTRA_carrier_TDD,reduced} = 0$. No reduced performance carrier requirement applies to a UE not supporting Increased UE carrier monitoring E-UTRA or UTRA [2, 31]. Capabilities for number of carriers to monitor for a UE which does not support Increased carrier monitoring E-UTRA or Increased carrier monitoring UTRA are specified in section 4.2.2.9

### 4.2.2.1 Measurement and evaluation of serving cell

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle.

The UE shall filter the RSRP and RSRQ measurements of the serving cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE is not configured with eDRX_IDLE cycle and has evaluated according to Table 4.2.2.1-1 in $N_{serv}$ consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities. If the UE is configured with eDRX_IDLE cycle and has evaluated according to Table 4.2.2.1-2 in $N_{serv}$ consecutive DRX cycles within a single PTW that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information during the time T, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1], where T=10 s if the UE is not configured with eDRX_IDLE cycle, and T=MAX(10 s, one eDRX_IDLE cycle) if the UE is configured with eDRX_IDLE cycle.

**Table 4.2.2.1-1: $N_{serv}$**

| DRX cycle length [s] | $N_{serv}$ [number of DRX cycles] |
|---|---|
| 0.32 | 4 |
| 0.64 | 4 |
| 1.28 | 2 |
| 2.56 | 2 |

**Table 4.2.2.1-2: $N_{serv}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $N_{serv}$ [number of DRX or eDRX cycles Note 3] |
|---|---|---|---|
| 5.12 | N/A | N/A | 2 |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 2 |
| | 0.64 | ≥1.28 (1) | 2 |
| | 1.28 | ≥2.56 (2) | 2 |
| | 2.56 | ≥5.12 (4) | 2 |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise. | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.2.2.2 Void

### 4.2.2.3 Measurements of intra-frequency E-UTRAN cells

The UE shall be able to identify new intra-frequency cells and perform RSRP and RSRQ measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within $T_{detect,EUTRAN_Intra}$ when that Treselection= 0. An intra frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in

- Annex B.1.3 for Cat-M1 UE
- Annex B.1.6 for category 1bis UE
- Annex B.1.1, otherwise

for a corresponding Band.

The UE shall measure RSRP and RSRQ at least every $T_{measure,EUTRAN_Intra}$ for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter RSRP and RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Intra}/2$

The UE shall not consider a E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{evaluate,E\text{-}UTRAN_intra}$ when $T_{reselection} = 0$, provided that the cell is

- at least 4dB better ranked for Cat-M1 UE and category 1bis UE
- at least 3 dB better ranked, otherwise

When evaluating cells for reselection, the side conditions for RSRP and SCH apply to both serving and non-serving intra-frequency cells.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is better ranked than the serving cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE neither configured with eDRX_IDLE cycle nor configured with *highSpeedEnhancedMeasFlag*, $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ are specified in Table 4.2.2.3-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ are specified in Table 4.2.2.3-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ when multiple PTWs are used. For UE configured with *highSpeedEnhancedMeasFlag*, $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ are specified in Table 4.2.2.3-3. For UE configured with *highSpeedEnhMeasFlag2-r16*, $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ are specified in Table 4.2.2.3-4.

**Table 4.2.2.3-1 : $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$**

| DRX cycle length [s] | $T_{detect,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

**Table 4.2.2.3-2: $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,E\text{-}UTRAN_intra}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Intra}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{measure,EUTRAN_Intra}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{evaluate,E\text{-}UTRAN_intra}$ [s] (number of DRX or eDRX cycles Note 3) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 ≤ eDRX_IDLE | 0.32 | ≥1.28 (1) | | 0.32 (1) | 0.64 (2) |

| | | | | | |
|---|---|---|---|---|---|
| cycle length ≤ 2621.44 | 0.64 | ≥1.28 (1) | $eDRX_cycle_length \times \left\lceil \frac{23}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (23) | 0.64 (1) | 1.28 (2) |
| | 1.28 | ≥2.56 (2) | | 1.28 (1) | 2.56 (2) |
| | 2.56 | ≥5.12 (4) | | 2.56 (1) | 5.12 (2) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise. | | | | | |

**Table 4.2.2.3-3 : $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ for UE configured with *highSpeedEnhancedMeasFlag***

| DRX cycle length [s] | $T_{detect,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 3.2 (10) | 0.32(1) | 0.96(3) |
| 0.64 | 6.4 (10) | 0.64 (1) | 1.92 (3) |
| 1.28 | 12.8(10) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

**Table 4.2.2.3-4 : $T_{detect,EUTRAN_Intra}$, $T_{measure,EUTRAN_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_intra}$ for UE configured with *highSpeedEnhMeasFlag2-r16***

| DRX cycle length [s] | $T_{detect,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 2.56 (8) | 0.32(1) | 0.96(3) |
| 0.64 | 5.12 (8) | 0.64 (1) | 1.92 (3) |
| 1.28 | 8.96 (7) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.2.2.4 Measurements of inter-frequency E-UTRAN cells

The UE shall be able to identify new inter-frequency cells and perform RSRP or RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided.

If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below.

If the UE is not configured with eDRX_IDLE cycle or configured with an eDRX_IDLE cycle not longer than 20.48 s, the UE shall be able to evaluate whether a newly detectable inter-frequency cell in normal performance group meets the reselection criteria defined in TS36.304 within $K_{carrier,normal}$ * $T_{detect,EUTRAN_Inter}$, and able to evaluate whether a newly detectable inter-frequency cell in reduced performance group meets the reselection criteria defined in TS36.304 within 6 * $K_{carrier,reduced}$ * $T_{detect,EUTRAN_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5dB for reselections based on ranking or 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, the UE shall be able to evaluate whether a newly detectable inter-frequency cell in normal performance group meets the reselection criteria defined in TS36.304 within $K_{carrier,normal}$ * $T_{detect,EUTRAN_Inter}$, and when Srxlev < 3 dB or Squal < 3 dB and able to evaluate

whether a newly detectable inter-frequency cell in reduced performance group meets the reselection criteria defined in TS36.304 within 6 * $K_{carrier,reduced}$ * $T_{detect,EUTRAN_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5dB for reselections based on ranking or 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities. An inter-frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.2 for a corresponding Band.

For UE category 1bis, if the UE is not configured with eDRX_IDLE cycle or configured with an eDRX_IDLE cycle not longer than 20.48 s, the UE shall be able to evaluate whether a newly detectable inter-frequency cell in normal performance group meets the reselection criteria defined in TS36.304 within $K_{carrier,normal}$ * $T_{detect,EUTRAN_Inter}$, and able to evaluate whether a newly detectable inter-frequency cell in reduced performance group meets the reselection criteria defined in TS36.304 within 6 * $K_{carrier,reduced}$ * $T_{detect,EUTRAN_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5.5dB for reselections based on ranking or 6.5dB for RSRP reselections based on absolute priorities or 5dB for RSRQ reselections based on absolute priorities. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, the UE shall be able to evaluate whether a newly detectable inter-frequency cell in normal performance group meets the reselection criteria defined in TS36.304 within $K_{carrier,normal}$ * $T_{detect,EUTRAN_Inter}$, and when Srxlev < 3 dB or Squal < 3 dB and able to evaluate whether a newly detectable inter-frequency cell in reduced performance group meets the reselection criteria defined in TS36.304 within 6 * $K_{carrier,reduced}$ * $T_{detect,EUTRAN_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5.5dB for reselections based on ranking or 6.5dB for RSRP reselections based on absolute priorities or 5dB for RSRQ reselections based on absolute priorities. An inter-frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.2 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,E-UTRAN_Inter}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

If the UE is configured with eDRX_IDLE cycle not longer than 20.48 s, the UE shall measure RSRP or RSRQ at least every $K_{carrier,normal}$ * $T_{measure,EUTRAN_Inter}$ for identified lower or equal priority inter-frequency cells in normal performance group, and at least every 6 * $K_{carrier,reduced}$ * $T_{measure,EUTRAN_Inter}$ for identified lower or equal priority inter-frequency cells in reduced performance group. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, the UE shall measure RSRP or RSRQ at least every $K_{carrier,normal}$ * $T_{measure,EUTRAN_Inter}$ for identified lower or equal priority inter-frequency cells in normal performance group, and when Srxlev < 3 dB or Squal < 3 dB at least every 6 * $K_{carrier,reduced}$ * $T_{measure,EUTRAN_Inter}$ for identified lower or equal priority inter-frequency cells in reduced performance group. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter RSRP or RSRQ measurements of each measured higher, lower and equal priority inter-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Inter}/2$.

The UE shall not consider a E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

If the UE is configured with eDRX_IDLE cycle not longer than 20.48 s, for an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell in normal performance group has met reselection criterion defined TS 36.304 within $K_{carrier,normal}$ * $T_{evaluate,E-UTRAN_Inter}$, and capable of evaluating that the inter-frequency cell in reduced performance group has met reselection criterion defined TS 36.304 within 6 * $K_{carrier,reduced}$ * $T_{evaluate,E-UTRAN_Inter}$, when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5dB for reselections based on ranking or 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, for an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell in normal performance group has met reselection criterion defined TS 36.304 within $K_{carrier,normal}$ * $T_{evaluate,E-UTRAN_Inter}$, and when Srxlev < 3 dB or Squal < 3 dB capable of evaluating that the inter-frequency cell in reduced performance group has met reselection criterion defined TS 36.304 within 6 * $K_{carrier,reduced}$ * $T_{evaluate,E-UTRAN_Inter}$,

when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 5dB for reselections based on ranking or 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities. When evaluating cells for reselection, the side conditions for RSRP and SCH apply to both serving and inter-frequency cells.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is better ranked than the serving cell, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter}$, $T_{measure,EUTRAN_Inter}$ and $T_{evaluate,\ E\text{-}UTRAN_inter}$ are specified in Table 4.2.2.4-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter}$, $T_{measure,EUTRAN_Inter}$ and $T_{evaluate,\ E\text{-}UTRAN_inter}$ are specified in Table 4.2.2.4-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Inter}$, $T_{measure,EUTRAN_Inter}$ and $T_{evaluate,\ E\text{-}UTRAN_inter}$ when multiple PTWs are used.

**Table 4.2.2.4-1 : $T_{detect,EUTRAN_Inter}$, $T_{measure,EUTRAN_Inter}$ and $T_{evaluate,E\text{-}UTRAN_Inter}$**

| DRX cycle length [s] | $T_{detect,EUTRAN_Inter}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Inter}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_Inter}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

**Table 4.2.2.4-2: $T_{detect,EUTRAN_Inter}$, $T_{measure,EUTRAN_Inter}$ and $T_{evaluate,\ E\text{-}UTRAN_inter}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Inter}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{measure,EUTRAN_Inter}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{evaluate,E\text{-}UTRAN_inter}$ [s] (number of DRX or eDRX cycles Note 3) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | $eDRX_cycle_length \times \left\lceil \frac{23}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (23) | 0.32 (1) | 0.64 (2) |
| | 0.64 | ≥1.28 (1) | | 0.64 (1) | 1.28 (2) |
| | 1.28 | ≥2.56 (2) | | 1.28 (1) | 2.56 (2) |
| | 2.56 | ≥5.12 (4) | | 2.56 (1) | 5.12 (2) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For higher priority cells, a UE may optionally use a shorter value for $T_{measureE\text{-}UTRA_Inter}$, which shall not be less than Max(0.64 s, one DRX cycle).

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.2.2.5 Measurements of inter-RAT cells

If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ then the UE shall search for inter-RAT layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-RAT layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT layers shall be the same as that defined below for lower priority RATs.

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

#### 4.2.2.5.1 Measurements of UTRAN FDD cells

When the measurement rules indicate that UTRA FDD cells are to be measured, the UE shall measure CPICH Ec/Io and CPICH RSCP of detected UTRA FDD cells in the neighbour frequency list at the minimum measurement rate specified in this section. The UE shall filter CPICH Ec/Io and CPICH RSCP measurements of each measured UTRA FDD cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least half the minimum specified measurement period.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, the UE shall evaluate whether newly detectable UTRA FDD cells in normal performance group have met the reselection criteria in TS 36.304 within time $N_{UTRA_carrier,normal}$ * $T_{detectUTRA_FDD}$ , and evaluate whether newly detectable UTRA FDD cells in reduced performance group have met the reselection criteria in TS 36.304 within time 6 * $N_{UTRA_carrier,reduced}$ * $T_{detectUTRA_FDD}$ when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ when $Treselection_{RAT}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB for reselections based on RSCP, or a margin of at least 3dB for reselections based on Ec/Io. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, the UE shall evaluate whether newly detectable UTRA FDD cells in normal performance group have met the reselection criteria in TS 36.304 within time ($N_{UTRA_carrier,normal}$) * $T_{detectUTRA_FDD}$ , and when Srxlev < 3 dB or Squal < 3 dB evaluate whether newly detectable UTRA FDD cells in reduced performance group have met the reselection criteria in TS 36.304 within time 6 * $N_{UTRA_carrier,reduced}$ * $T_{detectUTRA_FDD}$ when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ when $Treselection_{RAT}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB for reselections based on RSCP, or a margin of at least 3dB for reselections based on Ec/Io.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, cells which have been detected shall be measured at least every $N_{UTRA_carrier,normal}$ * $T_{measureUTRA_FDD}$ for the cells in normal performance group, and at least every 6 * $N_{UTRA_carrier,reduced}$ * $T_{measureUTRA_FDD}$ for the cells in reduced performance group when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, cells which have been detected shall be measured at least every ($N_{UTRA_carrier,normal}$) * $T_{measureUTRA_FDD}$ for the cells in normal performance group, and when Srxlev < 3 dB or Squal < 3 dB at least every 6 * $N_{UTRA_carrier,reduced}$ * $T_{measureUTRA_FDD}$ for the cells in reduced performance group when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$.

When higher priority UTRA FDD cells are found by the higher priority search, they shall be measured at least every $T_{measure,UTRA_FDD}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, for a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified UTRA FDD cell has met reselection criterion defined in TS 36.304 [1] within $N_{UTRA_carrier,normal}$ * $T_{evaluateUTRA_FDD}$ if the cell is in normal performance group and within 6 * $N_{UTRA_carrier,reduced}$ * $T_{evaluateUTRA_FDD}$ if the cell is in reduced performance group when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB for reselections based on RSCP, or a margin of at least 3dB for reselections based on Ec/Io. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, for a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified UTRA FDD cell has met reselection criterion defined in TS 36.304 [1] within ($N_{UTRA_carrier,normal}$) * $T_{evaluateUTRA_FDD}$ if the cell is in normal performance group and when Srxlev < 3 dB or Squal < 3 dB within 6 * $N_{UTRA_carrier,reduced}$ * $T_{evaluateUTRA_FDD}$ if the cell is in reduced performance group when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB for reselections based on RSCP, or a margin of at least 3dB for reselections based on Ec/Io.

If $T_{reselection}$ timer has a non zero value and the UTRA FDD cell is satisfied with the reselection criteria which are defined in [1], the UE shall evaluate this UTRA FDD cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detectUTRA_FDD}$, $T_{measureUTRA_FDD}$ and $T_{evaluateUTRA_FDD}$ are specified in Table 4.2.2.5.1-1. For UE configured with eDRX_IDLE cycle, $T_{detectUTRA_FDD}$, $T_{measureUTRA_FDD}$ and $T_{evaluateUTRA_FDD}$ are specified in Table 4.2.2.5.1-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detectUTRA_FDD}$, $T_{measureUTRA_FDD}$ and $T_{evaluateUTRA_FDD}$ when multiple PTWs are used.

**Table 4.2.2.5.1-1: $T_{detectUTRA_FDD}$, $T_{measureUTRA_FDD}$, and $T_{evaluateUTRA_FDD}$**

| DRX cycle length [s] | $T_{detectUTRA_FDD}$ [s] | $T_{measureUTRA_FDD}$ [s] (number of DRX cycles) | $T_{evaluateUTRA_FDD}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 30 | 5.12 (16) | 15.36 (48) |
| 0.64 | | 5.12 (8) | 15.36 (24) |
| 1.28 | | 6.4(5) | 19.2 (15) |
| 2.56 | 60 | 7.68 (3) | 23.04 (9) |

**Table 4.2.2.5.1-2: $T_{detectUTRA_FDD}$, $T_{measureUTRA_FDD}$ and $T_{evaluateUTRA_FDD}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detectUTRA_FDD}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{measureUTRA_FDD}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluateUTRA_FDD}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 15.36 (3) | 46.08 (9) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (23) | 0.96 (3) | Note 3 (9) |
| | 0.64 | ≥2.56 (2) | | 1.92 (3) | Note 3 (9) |
| | 1.28 | ≥3.84 (3) | | 3.84 (3) | Note 3 (9) |
| | 2.56 | ≥7.68 (6) | | 7.68 (3) | Note 3 (9) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: The time is calculated depending on the number N of DRX cycles as follows:

$$eDRX_cycle_length \times \left\lceil \frac{N}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$$

NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For higher priority cells, a UE may optionally use a shorter value for $T_{measureUTRA_FDD}$, which shall not be less than Max(0.64 s, one DRX cycle).

### 4.2.2.5.2 Measurements of UTRAN TDD cells

When the measurement rules indicate that UTRA TDD cells are to be measured, the UE shall measure P-CCPCH RSCP of detected UTRA TDD cells in the neighbour frequency list at the minimum measurement rate specified in this section. The UE shall filter P-CCPCH RSCP measurements of each measured UTRA TDD cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least half the minimum specified measurement period. If the UE is not configured with eDRX_IDLE cycle, P-CCPCH RSCP of UTRAN TDD cells shall not be filtered over a longer period than that specified in table 4.2.2.5.2-1. If the UE is configured with eDRX_IDLE cycle, P-CCPCH RSCP of UTRAN TDD cells shall not be filtered over a longer period than that specified in table 4.2.2.5.2-2.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, the UE shall evaluate whether newly detectable UTRA TDD cells in normal performance group have met the reselection criteria in TS 36.304 within time $N_{UTRA_carrier_TDD,normal} * T_{detectUTRA_TDD}$, and evaluate whether newly detectable UTRA TDD cells in reduced performance group have met the reselection criteria in TS 36.304 within time $6 * N_{UTRA_carrier_TDD,reduced} * T_{detectUTRA_TDD}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$ when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, the UE shall evaluate whether newly detectable UTRA TDD cells in normal performance group have met the reselection criteria in TS 36.304 within time $(N_{UTRA_carrier_TDD,normal}) * T_{detectUTRA_TDD}$, and when Srxlev < 3 dB or Squal < 3 dB evaluate whether newly detectable UTRA TDD cells in reduced performance group have met the reselection criteria

in TS 36.304 within time 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{detectUTRA_TDD}$ when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, cells which have been detected shall be measured at least every $N_{UTRA_carrier_TDD,normal}$ * $T_{measureUTRA_TDD}$ for the cells in normal performance group, and at least every 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{measureUTRA_TDD}$ for the cells in reduced performance group, when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, cells which have been detected shall be measured at least every ($N_{UTRA_carrier_TDD,normal}$) * $T_{measureUTRA_TDD}$ for the cells in normal performance group, and when Srxlev < 3 dB or Squal < 3 dB at least every 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{measureUTRA_TDD}$ for the cells in reduced performance group, when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$.

When higher priority UTRA TDD cells are found by the higher priority search, they shall be measured at least every $T_{measure,UTRA_TDD}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE is not configured with eDRX_IDLE cycle or configured with eDRX_IDLE cycle not longer than 20.48 s, for a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified UTRA TDD cell has met reselection criterion defined in [1] within $N_{UTRA_carrier_TDD,normal}$ *$T_{evaluateUTRA_TDD}$ if the cell is in normal performance group and within 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{evaluateUTRA_TDD}$ if the cell is in reduced performance group when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB. If the UE is configured with eDRX_IDLE cycle longer than 20.48 s, for a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified UTRA TDD cell has met reselection criterion defined in [1] within $N_{UTRA_carrier_TDD,normal}$ *$T_{evaluateUTRA_TDD}$ if the cell is in normal performance group and when Srxlev < 3 dB or Squal < 3 dB within 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{evaluateUTRA_TDD}$ if the cell is in reduced performance group when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6dB.

If $T_{reselection}$ timer has a non zero value and the UTRA TDD cell is satisfied with the reselection criteria which are defined in [1], the UE shall evaluate this UTRA TDD cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detectUTRA_TDD,}$ $T_{measureUTRA_TDD}$ and $T_{evaluateUTRA_TDD}$ are specified in Table 4.2.2.5.2-1. For UE configured with eDRX_IDLE cycle, $T_{detectUTRA_TDD,}$ $T_{measureUTRA_TDD}$ and $T_{evaluateUTRA_TDD}$ are specified in Table 4.2.2.5.2-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detectUTRA_TDD,}$ $T_{measureUTRA_TDD}$ and $T_{evaluateUTRA_TDD}$ when multiple PTWs are used.

**Table 4.2.2.5.2-1: $T_{detectUTRA_TDD}$, $T_{measureUTRA_TDD}$ and $T_{evaluateUTRA_TDD}$**

| DRX cycle length [s] | $T_{detectUTRA_TDD}$ [s] | $T_{measureUTRA_TDD}$ [s] (number of DRX cycles) | $T_{evaluateUTRA_TDD}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 30 | 5.12 (16) | 15.36 (48) |
| 0.64 | | 5.12 (8) | 15.36 (24) |
| 1.28 | | 6.4(5) | 19.2 (15) |
| 2.56 | 60 | 7.68 (3) | 23.04 (9) |

**Table 4.2.2.5.2-2: $T_{detectUTRA_TDD,}$ $T_{measureUTRA_TDD}$ and $T_{evaluateUTRA_TDD}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detectUTRA_TDD}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{measureUTRA_TDD}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluateUTRA_TDD}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 15.36 (3) | 46.08 (9) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (23) | 0.96 (3) | Note 3 (9) |
| | 0.64 | ≥2.56 (2) | | 1.92 (3) | Note 3 (9) |
| | 1.28 | ≥3.84 (3) | | 3.84 (3) | Note 3 (9) |
| | 2.56 | ≥7.68 (6) | | 7.68 (3) | Note 3 (9) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: The time is calculated depending on the number N of DRX cycles as follows:

$$eDRX\ _cycle\ _length \times \left\lceil \frac{N}{\lceil PTW\ /\ DRX\ _cycle\ _length \rceil} \right\rceil$$

NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For higher priority cells, a UE may optionally use a shorter value for $T_{measureUTRA_TDD}$, which shall not be less than Max(0.64 s, one DRX cycle).

#### 4.2.2.5.3 Measurements of GSM cells

When the measurement rules defined in [1] indicate that E-UTRAN inter-frequencies or inter-RAT frequency cells are to be measured, the UE shall measure the signal level of the GSM BCCH carriers if the GSM BCCH carriers are indicated in the measurement control system information of the serving cell. GSM BCCH carriers of lower priority than the serving cell shall be measured at least every $T_{measure,GSM}$.

When higher priority GSM BCCH carriers are found by the higher priority search, they shall be measured at least every $T_{measure,GSM,}$ and the UE shall decode the BSIC of the GSM BCCH carrier. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection, or to continuously verify the BSIC of the GSM BCCH carrier every 30s. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

The UE shall maintain a running average of 4 measurements for each GSM BCCH carrier. The measurement samples for each cell shall be as far as possible uniformly distributed over the averaging period.

If continuous GSM measurements are required by the measurement rules in [1], the UE shall attempt to verify the BSIC at least every 30 seconds for each of the 4 strongest GSM BCCH carriers. If a change of BSIC is detected for one GSM cell then that GSM BCCH carrier shall be treated as a new GSM neighbour cell. If the UE detects on a BCCH carrier a BSIC which is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform BSIC re-confirmation for that cell.

The UE shall not consider the GSM BCCH carrier in cell reselection, if the UE cannot demodulate the BSIC of that GSM BCCH carrier. Additionally, the UE shall not consider a GSM neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

If $T_{reselection}$ timer has a non zero value and the GSM cell is satisfied with the reselection criteria which are defined in [1], the UE shall evaluate this GSM cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{measure,GSM}$ is specified in Table 4.2.2.5.3-1. For UE configured with eDRX_IDLE cycle, $T_{measure,GSM}$ is specified in Table 4.2.2.5.3-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during $T_{measure,GSM}$ when multiple PTWs are used.

**Table 4.2.2.5.3-1: $T_{measure,GSM,}$**

| DRX cycle length [s] | $T_{measure,GSM}$ [s] (number of DRX cycles) |
|---|---|
| 0.32 | 5.12 (16) |
| 0.64 | 5.12 (8) |
| 1.28 | 6.4(5) |
| 2.56 | 7.68 (3) |

**Table 4.2.2.5.3-2: $T_{measure,GSM}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{measure,GSM}$ [s] (number of DRX or eDRX cycles Note 3) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 5.12 | N/A | N/A | 15.36 (3) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 0.96 (3) |
| | 0.64 | ≥2.56 (2) | 1.92 (3) |
| | 1.28 | ≥3.84 (3) | 3.84 (3) |
| | 2.56 | ≥7.68 (6) | 7.68 (3) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise. | | | |

#### 4.2.2.5.4 Measurements of HRPD cells

In order to perform measurement and cell reselection to HRPD cell, the UE shall acquire the timing of HRPD cells.

When the measurement rules indicate that HRPD cells are to be measured, the UE shall measure CDMA2000 HRPD Pilot Strength of HRPD cells in the neighbour cell list at the minimum measurement rate specified in this section.

The parameter 'Number of HRPD Neighbor Frequency', which is transmitted on E-UTRAN BCCH, is the number of carriers used for all HRPD cells in the neighbour cell list.

When the E-UTRA serving cell fulfils Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for CDMA2000 HRPD layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is defined in clause 4.2.2.

For CDMA2000 HRPD cells which have been detected, the UE shall measure CDMA2000 HRPD Pilot Strength at least every (Number of HRPD Neighbor Frequency)*$T_{measureHRPD}$, when the E-UTRA serving cell Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$.

The UE shall be capable of evaluating that the CDMA2000 HRPD cell has met cell reselection criterion defined in [1] within $T_{evaluateHRPD}$.

For UE not configured with eDRX_IDLE cycle, Table 4.2.2.5.4-1 gives values of $T_{measureHRPD}$ and $T_{evaluateHRPD}$. For UE configured with eDRX_IDLE cycle, $T_{measureHRPD}$ and $T_{evaluateHRPD}$ are specified in Table 4.2.2.5.4-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{measureHRPD}$ and $T_{evaluateHRPD}$ when multiple PTWs are used.

**Table 4.2.2.5.4-1: $T_{measureHRPD}$ and $T_{evaluateHRPD}$**

| DRX cycle length [s] | $T_{measureHRPD}$ [s] (number of DRX cycles) | $T_{evaluateHRPD}$ [s] (number of DRX cycles) |
|---|---|---|
| 0.32 | 5.12 (16) | 15.36 (48) |
| 0.64 | 5.12 (8) | 15.36 (24) |
| 1.28 | 6.4 (5) | 19.2 (15) |
| 2.56 | 7.68 (3) | 23.04 (9) |

**Table 4.2.2.5.4-2: $T_{measureHRPD}$ and $T_{evaluateHRPD}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{measureHRPD}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluateHRPD}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|
| 5.12 | N/A | N/A | 15.36 (3) | 46.08 (9) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 0.96 (3) | Note 3 (9) |
| | 0.64 | ≥2.56 (2) | 1.92 (3) | Note 3 (9) |
| | 1.28 | ≥3.84 (3) | 3.84 (3) | Note 3 (9) |
| | 2.56 | ≥7.68 (6) | 7.68 (3) | Note 3 (9) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: The time is calculated depending on the number N of DRX cycles as follows:

$$eDRX\ _cycle\ _length \times \left\lceil \frac{N}{\lceil PTW\ /\ DRX\ _cycle\ _length \rceil} \right\rceil$$

NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

If $T_{reselection}$ timer has a non zero value and the CDMA2000 HRPD cell is satisfied with the reselection criteria which are defined in [1], the UE shall evaluate this CDMA2000 HRPD cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

### 4.2.2.5.5 Measurements of cdma2000 1X

In order to perform measurement and cell reselection to cdma2000 1X cell, the UE shall acquire the timing of cdma2000 1X cells.

When the measurement rules indicate that cdma2000 1X cells are to be measured, the UE shall measure cdma2000 1x RTT Pilot Strength of cdma2000 1X cells in the neighbour cell list at the minimum measurement rate specified in this section.

The parameter 'Number of CDMA2000 1X Neighbor Frequency', which is transmitted on E-UTRAN BCCH, is the number of carriers used for all cdma2000 1X cells in the neighbour cell list.

When the E-UTRA serving cell fulfils Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for cdma2000 1X layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is defined in clause 4.2.2.

For CDMA2000 1X cells which have been detected, the UE shall measure CDMA2000 1xRTT Pilot Strength at least every (Number of CDMA2000 1X Neighbor Frequency)*$T_{measureCDMA2000_1X}$, when the E-UTRA serving cell Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$. The UE shall be capable of evaluating that the cdma2000 1X cell has met cell reselection criterion defined in [1] within $T_{evaluateCDMA2000_1X}$.

For UE not configured with eDRX_IDLE cycle, Table 4.2.2.5.5-1 gives values of $T_{measureCDMA2000_1X}$ and $T_{evaluateCDMA2000_1X}$. For UE configured with eDRX_IDLE cycle, $T_{measureCDMA2000_1X}$ and $T_{evaluateCDMA2000_1X}$ are specified in Table 4.2.2.5.5-2 where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{measureCDMA2000_1X}$ and $T_{evaluateCDMA2000_1X}$ when multiple PTWs are used.

**Table 4.2.2.5.5-1: $T_{measureCDMA2000\ 1X}$ and $T_{evaluateCDMA2000\ 1X}$**

| DRX cycle length [s] | $T_{measureCDMA2000_1X}$ [s] (number of DRX cycles) | $T_{evaluateCDMA2000_1X}$ [s] (number of DRX cycles) |
|---|---|---|
| 0.32 | 5.12 (16) | 15.36 (48) |
| 0.64 | 5.12 (8) | 15.36 (24) |
| 1.28 | 6.4 (5) | 19.2 (15) |
| 2.56 | 7.68 (3) | 23.04 (9) |

**Table 4.2.2.5.5-2: $T_{measureCDMA2000_1X}$ and $T_{evaluateCDMA2000_1X}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{measureCDMA2000_1x}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluateCDMA2000_1x}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|
| 5.12 | N/A | N/A | 15.36 (3) | 46.08 (9) |
| 10.24 ≤ eDRX_IDLE cycle | 0.32 | ≥1.28 (1) | 0.96 (3) | Note 3 (9) |
| | 0.64 | ≥2.56 (2) | 1.92 (3) | Note 3 (9) |
| | 1.28 | ≥3.84 (3) | 3.84 (3) | Note 3 (9) |

| | | | | |
|---|---|---|---|---|
| length ≤ 2621.44 | 2.56 | ≥7.68 (6) | 7.68 (3) | Note 3 (9) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: The time is calculated depending on the number N of DRX cycles as follows: $eDRX_cycle_length \times \left\lceil \frac{N}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$<br>NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise | | | | |

If $T_{reselection}$ timer has a non zero value and the CDMA2000 1X cell is satisfied with the reselection criteria which are defined in [1], the UE shall evaluate this CDMA2000 1X cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

#### 4.2.2.5.6 Measurements of NR cells

If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ then the UE shall search for inter-RAT NR layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-RAT NR layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT NR layers shall be the same as that defined below for lower priority RATs.

The requirements in this section apply for inter-RAT NR measurements. When the measurement rules indicate that inter-RAT NR cells are to be measured, the UE shall measure SS-RSRP and SS-RSRQ of detected NR cells in the neighbour frequency list at the minimum measurement rate specified in this section. If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$, a carrier is indicated to meet high speed requirement if *highSpeedInterRAT-NR-r16* is configured and the carrier to be measured is configured with *highSpeedCarrierNR-r16*. If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE is required to meet non high speed requirements no matter whether *highSpeedInterRAT-NR-r16* or *highSpeedCarrierNR-r16* is configured or not. The parameter $N_{NR_carrier}$ is the number of configured NR carriers indicated to meet non high speed requirement in the neighbour frequency list. $N_{NR_carrier_HST}$ is the number of configured carriers for reselection indicated to meet high speed requirements.

The parameter $N_{NR_carrier}$ for a UE configured with idle mode DC measurements (while T331 is running) is the combined number of configured NR carriers indicated to meet non high speed requirement in the neighbour frequency list, and NR carriers configured for idle mode DC measurements, excluding the configured NR carriers for reselection indicated to meet high speed requirements.

> Note: combined total number means that if a carrier is indicated in the neighbour frequency list and additionally a carrier configured for idle mode DC measurements, it only counts as one carrier.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured NR cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least half the minimum specified measurement period.

The UE shall be able to evaluate whether a newly detectable inter-RAT NR cell meets the reselection criteria defined in TS 36.304 [1] within $N_{NR_carrier_HST} * T_{detect,\ NR_HST} + N_{NR_carrier} * T_{detect,\ NR}$

when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,NR}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this section shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE detects on an inter-RAT NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall not consider an inter-RAT NR cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

Cells which have been detected shall be measured at least every $N_{NR_carrier_HST} * T_{measure, NR_HST} + N_{NR_carrier} * T_{measure, NR}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$.

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT NR cell has met reselection criterion defined in TS 36.304 [1] within $N_{NR_carrier_HST} * T_{evaluate, NR_HST} + N_{NR_carrier} * T_{evaluate, NR}$ when $T_{reselection} = 0$ as specified in Table 4.2.2.5.6-1 and table 4.2.2.5.6-2 provided that the reselection criteria is met by a margin of at least 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-RAT NR cell is satisfied with the reselection criteria which are defined in TS 36.304 [1], the UE shall evaluate this NR cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

**Table 4.2.2.5.6-1: $T_{detect,NR}$, $T_{measureNR,}$ and $T_{evaluate,NR}$**

| DRX cycle length [s] | Scaling Factor (N1) | | $T_{detect,NR}$ [s] (number of DRX cycles) | $T_{measure,NR}$ [s] (number of DRX cycles) | $T_{evaluate,NR}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| | FR1 | FR2[Note1] | | | |
| 0.32 | 1 | 8 | 11.52 x 1.5 x N1 (36 x 1.5 x N1) | 1.28 x 1.5 x N1 (4 x 1.5 x N1) | 5.12 x 1.5 x N1 (16 x 1.5 x N1) |
| 0.64 | | 5 | 17.92 x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) |
| 1.28 | | 4 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) |
| 2.56 | | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| NOTE 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length. | | | | | |

**Table 4.2.2.5.6-2: $T_{detect,NR_HST}$, $T_{measureNR_HST,}$ and $T_{evaluate,NR_HST}$ for UE configured with highSpeedInterRAT-NR-r16**

| DRX cycle length [s] | $T_{detect,NR_HST}$ [s] (number of DRX cycles) | $T_{measure,NR_HST}$ [s] (number of DRX cycles) | $T_{evaluate,NR_HST}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 4.16 x M2 (13 x M2)[Note 2] | 0.64 x M3 (2 x M3)[Note 2] | 0.96 x M4 (3 x M4) [Note 2] |
| 0.64 | 7.68 (12)) | 1.28 (2) | 1.92 (3) |
| 1.28 | 12.8(10) | 1.28 (1) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| Note 1: FR2 high speed requirements are not specified.<br>Note 2: M2=1.5, M3=2 and M4=2 if SMTC periodicity of measured intra-frequency cell > 40 ms; otherwise M2=M3=M4=1. | | | |

### 4.2.2.5.7 Measurements of NR cells subject to CCA

The UE shall be able to identify new inter-RAT cells subject to CCA and perform SS-RSRP or SS-RSRQ measurements of identified inter-RAT cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided.

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-RAT layers of higher priority at least every $T_{higher_priority_search}$.

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-RAT layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below in this subclause.

The UE shall be able to evaluate whether a newly detectable inter-RAT cell meets the reselection criteria defined in TS38.304 within $K_{carrier} * T_{detect,NR_Inter} + K_{carrier_CCA} * T_{detect,NR_Inter_CCA}$ if at least carrier frequency information is provided for inter-RAT neighbour cells by the serving cells when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB in FR1 for SS-RSRP reselections based on absolute priorities or 4dB in FR1 for SS-RSRQ reselections based on absolute priorities.

The parameter $K_{carrier}$ is the number of NR inter-RAT carriers on licensed band and $K_{carrier_CCA}$ is the number of NR inter-RAT carriers on unlicensed band indicated by the serving cell. An inter-RAT cell is considered to be detectable according to the conditions defined in Annex B.x.y for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,NR_Inter_CCA}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this section shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure SS-RSRP or SS-RSRQ at least every $K_{carrier} * T_{measure,NR_Inter} + K_{carrier_CCA} * T_{measure,NR_Inter_CCA}$ (see table 4.2.2.5.7-1) for identified lower priority inter-RAT cells. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

For a cell that is already identified, after 2 unsuccessful measurement attempts due to exceeding the maximum number of SMTC occasions not available at the UE, the UE shall detect cells on any of the configured serving- and/or non-serving carriers.

In the requirements of clause 4.2.2.5.7, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the *N* candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding detection, measurement, or evaluation period, where:

- For the cell detection procedure: *N* is at least one candidate SSB position (NOTE: the one candidate SSB position for the cell detection shall not be impacted by the set of candidate SSB positions which are already being measured by the UE within the current measurement period of the on-going measurements), and

- For other procedures in clause 4.2.2.5.7: *N* are the first two successive candidate SSB positions when two or more candidate SSB positions are configured for this SSB index in one discovery burst transmission window, otherwise N is one candidate SSB position;

otherwise the SMTC occasion is considered as available at the UE.

The UE shall filter SS-RSRP or SS-RSRQ measurements of each measured higher and lower priority inter-RAT cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NR_Inter_CCA}/2$.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-RAT cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-RAT cell has met reselection criterion defined TS 38.304 within $K_{carrier} * T_{evaluate,NR_Inter} + K_{carrier_CCA} * T_{evaluate,NR_Inter_CCA}$ when $T_{reselection} = 0$ as specified in table 4.2.2.5.7-1 provided that the reselection criteria is met by

- 6dB in FR1 for SS-RSRP reselections based on absolute priorities or

- 4dB in FR1 for SS-RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-RAT cell is satisfied with the reselection criteria, the UE shall evaluate this inter-RAT cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

**Table 4.2.2.5.7-1: $T_{detect,NR_Inter_CCA}$, $T_{measure,NR_Inter_CCA}$ and $T_{evaluate,NR_Inter_CCA}$**

| DRX cycle length [s] | $T_{detect,NR_Inter_CCA}$ [s] (number of DRX cycles) | $T_{measure,NR_Inter_CCA}$ [s] (number of DRX cycles) | $T_{evaluate,NR_Inter_CCA}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 0.32x([36]+$M_d$)<br>{([36]+ $M_d$) } | 0.32x([4]+$M_m$)<br>{([4]+ $M_m$) } | 0.32x([16]+$M_e$)<br>{([16]+ $M_e$) } |
| 0.64 | 0.64x([28]+ $M_d$)<br>{[28]+ $M_d$ } | 0.64x([2]+ $M_m$)<br>{[2]+ $M_m$ } | 0.64x([8]+ $M_e$)<br>{[8]+ $M_e$ } |
| 1.28 | 1.28x([25]+ $M_d$)<br>{[25]+ $M_d$ } | 1.28x([1]+ $M_m$)<br>{[1]+ $M_m$ } | 1.28x([5]+ $M_e$)<br>{[5]+ $M_e$ } |
| 2.56 | 2.56x([23]+ $M_d$)<br>{[23]+ $M_d$ } | 2.56x([1]+ $M_m$)<br>{[1]+ $M_m$ } | 2.56x([3]+ $M_e$)<br>{[3]+ $M_e$ } |

Note 1: Md, Mm, Me are the number of DRX cycles each with at least one SMTC occasion not available at the UE during the $T_{detect,NR_Inter_CCA}$,, $T_{measure,NR_Inter_CCA}$ and $T_{evaluate,NR_Inter_CCA}$, respectively. $M_{m,max}$, $M_{d,max}$ and $M_{e,max}$ are the maximum values of $M_m$, $M_d$ and $M_e$, respectively.
Note 2: $M_m \le M_{m,max}$, where: $M_{m,max}$ = [16] for DRX cycle = 0.32 seconds, $M_{m,max}$ = [8] for DRX cycle = 0.64 seconds, $M_{m,max}$ = [4] for DRX cycle = 1.28 seconds, $M_{m,max}$ = [4] for DRX cycle = 2.56 seconds,
Note 3: $M_d \le M_{d,max}$, where: $M_{d,max}$ = [4] * $M_{m,max}$,
Note 4: $M_e \le M_{e,max}$, where: $M_{e,max}$ = [2] * $M_{m,max}$,

The UE shall restart the measurements upon exceeding $M_{m,max}$, $M_{d.max}$, or $M_{e,max}$.

### 4.2.2.6 Evaluation of cell re-selection criteria

The UE shall evaluate the intra-frequency, inter-frequency and inter-RAT cell reselection criteria defined in [1] at least every DRX cycle. When a non zero value of $T_{reselection}$ is used, the UE shall only perform reselection on an evaluation which occurs simultaneously to, or later than the expiry of the $T_{reselection}$ timer.

For UE configured with eDRX_IDLE cycle, the cell reselection criteria shall be evaluated within at least every DRX cycle within the PTW.

### 4.2.2.7 Maximum interruption in paging reception

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception. When the UE is configured with eDRX_IDLE cycle, the UE shall not miss any paging in a PTW provided the paging is sent in at least 2 DRX cycles before the end of that PTW.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI\text{-}EUTRA}$ + 50 ms.

At inter-RAT cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels for paging reception of the target inter-RAT cell. For E-UTRAN to UTRA cell re-selection the interruption time must not exceed $T_{SI\text{-}UTRA}$ + 50 ms. For E-UTRAN to GSM cell re-selection the interruption time must not exceed $T_{BCCH}$ + 50 ms. For E-UTRAN to NR cell re-selection the interruption time must not exceed $T_{SI\text{-}NR}$ + 2*$T_{target_cell_SMTC_period}$ ms.

$T_{SI\text{-}EUTRA}$ is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for a E-UTRAN cell.

$T_{SI\text{-}UTRA}$ is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in [7] for a UTRAN cell.

$T_{BCCH}$ is the maximum time allowed to read BCCH data from a GSM cell defined in [8].

$T_{SI\text{-}NR}$ is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [38] for an NR cell.

$T_{target_cell_SMTC_period}$ is the periodicity of the SMTC occasions configured for the target NR cell. If the target cell is in the PCI list of *smtc2-LP-r16*, the SMTC periodicity follows the periodicity configured in *smtc2-LP-r16*; otherwise, the SMTC periodicity follows *measTimingConfig-r15*. $T_{target_cell_SMTC_period}$ = 5ms if both *measTimingConfig-r15* and *smtc2-LP-r16* are not configured.

These requirements assume sufficient radio conditions, so that decoding of system information can be made without errors and does not take into account cell re-selection failure.

At cell re-selection to HRPD, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable of starting to monitor downlink channels for paging reception of the target HRPD cell. For HRPD cell re-selection the interruption time must not exceed $T_{SI-HRPD}$ + 50 ms.

$T_{SI-HRPD}$ is the time required for receiving all the relevant system information data according to the reception procedure and the upper layer (Layer 3) procedure delay of system information blocks defined in [11] in for HRPD cell.

At cell re-selection to cdma2000 1X, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable of starting to monitor downlink channels for paging reception of the target cdma2000 1X cell. For cdma2000 1X cell re-selection the interruption time must not exceed $T_{SI-cdma2000_1X}$ + 50 ms.

$T_{SI-cdma2000_1X}$ is the time required for receiving all the relevant system information data according to the reception procedure and the upper layer (Layer 3) procedure delay of system information blocks defined in [15] for cdma2000 1X cell.

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.2.2.8 void

### 4.2.2.9 UE measurement capability

For idle mode cell re-selection purposes, and for UE supporting *ca-IdleModeMeasurements-r15* LTE CA or *endc-IdleInactiveMeasFR1-r16* and/or *endc-IdleInactiveMeasFR2-r16* MR-DC measurements, the UE shall be capable of monitoring at least:

- Intra-frequency carrier, and
- Depending on UE capability, 3 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 3 TDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers, and
- Depending on UE capability, 3 cdma2000 1x carriers, and
- Depending on UE capability, 3 HRPD carriers.
- Depending on UE capability, 8 NR inter-RAT carriers.

In addition to the requirements defined above, a UE supporting E-UTRA measurements and any of the above inter-RAT measurements excluding NR measurements in RRC_IDLE state shall be capable of monitoring a total of at least 8 carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 cells), cdma2000 1x and HRPD layers.

In addition to the requirements defined above, the UE which supports E-UTRA measurements and any of the above inter-RAT measurements including NR measurements in RRC_IDLE state shall be capable of monitoring a total of at least 10 effective carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x, HRPD and NR layers.

### 4.2.2.9a UE measurement capability (Increased UE carrier monitoring)

UE which support Increased UE carrier monitoring E-UTRA according to the capabilities in [2,31] shall be capable of monitoring at least

- Depending on UE capability, 8 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 8 TDD E-UTRA inter-frequency carriers

UE which support increased UE carrier monitoring UTRA according to the capabilities in [2,31] shall additionally be capable of monitoring at least

- Depending on UE capability, 6 FDD UTRA carriers, and
- Depending on UE capability, 7 TDD UTRA carriers, and

In addition to the requirements defined above, a UE supporting E-UTRA measurements in RRC_IDLE state and supporting Increased UE carrier monitoring E-UTRA or increased UE carrier monitoring UTRA according to the capabilities in [2,31] shall be capable of monitoring a total of at least 13 carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 cells), cdma2000 1x and HRPD layers.

In addition to the requirements defined above, the UE which indicates support for Increased UE carrier monitoring E-UTRA or increased UE carrier monitoring UTRA according to the capabilities in [2,31], and also supports standalone NR, shall be capable of monitoring a total of at least 15 carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x, HRPD and NR layers.

The requirements in this section apply for UE regardless of their capability to support eDRX_IDLE.

### 4.2.2.10 Reselection to CSG cells

Note: Requirements in this clause are minimum requirements defined to ensure the testability of autonomous CSG search. Further information on autonomous search times in practical deployments is available in [25].

Reselection from non CSG to CSG cells may be performed using UE autonomous search as defined in [1] when at least one CSG ID is included in the UE's CSG whitelist. The requirements in this clause are valid for reselection to CSG cells previously visited by the UE when the radio configuration parameters, including the carrier frequency and physical cell identity of the CSG cell, non CSG cell and other neighbour cells are unchanged from the most recent previous visit.

NOTE: According to [1], the UE autonomous search function, per UE implementation, determines when and/or where to search for allowed CSG cells.

#### 4.2.2.10.1 Reselection from a non CSG to an inter-frequency CSG cell

The UE shall perform search and reselection to an allowed inter-frequency CSG cell that has met CSG reselection criterion defined in [1] and that is in its whitelist, within 6 minutes in the conditions shown in table 4.2.2.10.1-1. There is no need for statistical testing of this requirement.

**Table 4.2.2.10.1-1: Parameters for CSG inter-frequency reselection**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| EARFCN Note1 | | Channel 1 | Channel 2 |
| CSG indicator | | False | True |
| Physical cell identity Note1 | | 1 | 2 |
| CSG identity | | Not sent | Sent (Already stored in UE whitelist from previous visit) |
| Propagation conditions | | Static, non multipath | |
| CSG cell previously visited by UE | | Yes | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |

| | | | |
|---|---|---|---|
| *PSS_RA* | *dB* | 0 | 0 |
| *SSS_RA* | *dB* | | |
| *PCFICH_RB* | *dB* | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| Qrxlevmin | dBm | -140 | -140 |
| $N_{oc}$ | dBm/15 kHz | Off | |
| RSRP Note2 | dBm/15 KHz | -110 | -110 |
| Note 1: For this requirement to be applicable, the EARFCN and physical cell identity for cell 1 and cell 2 shall be unchanged from when the CSG cell was visited previously<br>Note 2: Chosen to ensure that CSG autonomous search has a high probability of success on every attempt made by UE | | | |

### 4.2.2.10.2 Reselection from a non CSG to an inter-RAT UTRAN FDD CSG cell

The UE shall perform search and reselection to an allowed inter-RAT UTRAN FDD CSG cell that has met CSG reselection criterion defined in [1] and that is in its whitelist, within 6 minutes in the conditions shown in table 4.2.2.10.2-1. There is no need for statistical testing of this requirement.

**Table 4.2.2.10.2-1: Parameters for CSG inter-RAT UTRAN FDD reselection**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| EARFCN Note1 | | Channel 1 | N/A |
| UARFCN Note1 | | N/A | Channel 2 |
| CSG indicator | | False | True |
| Physical cell identity Note1 | | 1 | N/A |
| Primary scrambling code Note1 | | N/A | Scrambling code 2 |
| CSG identity | | Not sent | Sent (Already stored in UE whitelist from previous visit) |
| Propagation conditions | | Static, non multipath | |
| CSG cell previously visited by UE | | Yes | |
| PBCH_RA | dB | 0 | N/A |
| PBCH_RB | dB | | |
| *PSS_RA* | *dB* | | |
| *SSS_RA* | *dB* | | |
| *PCFICH_RB* | *dB* | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| Qrxlevmin | dBm | -140 | |
| $N_{oc}$ | dBm/15 kHz | Off | |
| RSRP Note2 | dBm/15 KHz | -110 | |
| CPICH_RSCP Note2 | dBm | N/A | -100 |
| CPICH_Ec/Ior | dB | | -10 |
| PCCPCH_Ec/Ior | dB | | -12 |
| SCCPCH_Ec/Ior | dB | | -12 |

| | | | |
|---|---|---|---|
| AICH_Ec/Ior | dB | | -15 |
| SCH_Ec/Ior | dB | | -15 |
| PICH_Ec/Ior | dB | | -15 |
| $I_{oc}$ | dBm/3.84 MHz | | Off |
| Note 1: For this requirement to be applicable, the EARFCN and physical cell identity for cell 1 and the UARFCN and scrambling code for cell 2 shall be unchanged from when the CSG cell was visited previously<br>Note 2: Chosen to ensure that CSG autonomous search has a high probability of success on every attempt made by UE | | | |

#### 4.2.2.11 Void

#### 4.2.2.12 Void

#### 4.2.2.13 Void

## 4.3 Minimization of Drive Tests (MDT)

UE supporting minimisation of drive tests in RRC_IDLE shall be capable of:

- logging measurements in RRC_IDLE, reporting the logged measurements and meeting requirements in this clause;
- logging of RRC connection establishment failure, reporting the logged failure and meeting requirements in this clause;
- logging of radio link failure and handover failure, reporting the logged failure and meeting requirements in this clause.

### 4.3.1 Introduction

The logged MDT requirements consist of measurement requirements as specified in clause 4.3.2 and relative time stamp accuracy requirements as specified in clause 4.3.3. Both sets of requirements are applicable for intra-frequency, inter-frequency and inter-RAT cases in RRC_IDLE state. The MDT procedures are described in [27].

For RRC connection establishment failure logging and reporting, the MDT requirements consist of requirements for measurements performed and logged in RRC_IDLE state specified in clause 4.3.2 and relative time stamp accuracy requirement for RRC connection establishment failure log reporting as specified in clause 4.3.4.

### 4.3.2 Measurements

The requirements specified in this clause apply for the measurements (GSM carrier RSSI, UTRA CPICH RSCP, UTRA CPICH Ec/Io, P-CCPCH RSCP for UTRA 1.28 TDD, E-UTRA RSRP, E-UTRA RSRQ, MBSFN RSRP, MBSFN RSRQ, and MCH BLER) performed and logged by the UE for MDT in RRC_IDLE. The requirements apply for the measurements included in logged MDT reports and RRC connection establishment failure reports.

#### 4.3.2.1 Requirements

The measurement values that are used to meet

- serving cell and reselection requirements as specified in sections 4.2.2.1, 4.2.2.3, 4.2.2.4, 4.2.2.5,
- MBSFN measurement requirements as specified in section 4.4,

shall also apply to values logged for MDT measurements in RRC_IDLE state.

### 4.3.3 Relative Time Stamp Accuracy

The relative time stamp for a logged measurement is defined as the time from the moment the MDT configuration was received at the UE until the measurement was logged, see TS 36.331 [2].

#### 4.3.3.1 Requirements

The accuracy of the relative time stamping is such that the drift of the time stamping shall be not more than ± 2 seconds per hour.

### 4.3.4 Relative Time Stamp Accuracy for RRC Connection Establishment Failure Log Reporting

Relative time stamp for RRC connection establishment failure log reporting is defined as the time elapsed from the last RRC connection establishment failure to the time when the log is included in the report TS 36.331 [2]. The UE shall report the RRC connection establishment failure log, while meeting the accuracy requirement specified in clause 4.3.4.1.

#### 4.3.4.1 Requirements

The accuracy of the relative time stamping for RRC connection establishment failure log reporting is such that the drift of the time stamping shall not be larger than ± 0.72 seconds per hour and ± 10 seconds over 48 hours. The relative time stamp accuracy requirements shall apply provided that:

- no power off or detach occurs after the RRC connection establishment failure had been detected and until the log is time-stamped.

NOTE: This requirement does not need to be tested.

### 4.3.5 Relative Time Stamp Accuracy for Radio Link Failure and Handover Failure Log Reporting

The UE shall report the radio link and handover failure log, while meeting the accuracy requirements specified in this section.

#### 4.3.5.1 Requirements for *timeSinceFailure*

Relative time stamp accuracy requirements for *timeSinceFailure* reported for MDT in a radio link failure or handover failure log are specified in this clause. *timeSinceFailure* determines the time elapsed from the last radio link failure or handover failure in E-UTRA to the time when the log is included in the report TS 36.331 [2].

The accuracy of the relative time stamping for *timeSinceFailure* is such that the drift of the time stamping shall not be larger than ± 0.72 seconds per hour and ± 10 seconds over 48 hours. These relative time stamp accuracy requirements shall apply provided that:

- no power off or detach occurs after the RLF or handover failure had been detected and until the log is time-stamped.

## 4.4 MBSFN Measurements

### 4.4.1 Introduction

The requirements specified in Section 4.4 apply for MBSFN measurements (MBSFN RSRP, MBSFN RSRQ, and MCH BLER defined in [4]), which are performed in RRC_IDLE state and logged for MDT by UEs which are MBMS-capable and also indicate their MBSFN measurement logging capability [2].

UE shall measure MBSFN RSRP, MBSFN RSRQ and MCH BLER only in subframes and on carriers where UE is decoding PMCH. The requirements are specified for any carrier where PMCH is received by UE. The requirements specified in this section apply for any carrier frequency with configured MBSFN subframes with PMCH, which may be the same as or different from any serving unicast carrier.

The UE receiving PMCH on any non-serving carrier and performing MBSFN measurements shall not cause interruptions on any serving carrier in the subframes with paging and non-MBSFN multicast transmissions such as system information.

### 4.4.2 MBSFN RSRP measurements

For UE in RRC_IDLE, the physical layer shall be capable of performing the MBSFN RSRP measurement [4] within the MBSFN RSRP measurement period and log the measurement, while meeting the MBSFN RSRP measurement accuracy requirements specified in section 9.8.2. The MBSFN RSRP measurement logging shall be according to the MBSFN RSRP measurement report mapping specified in Section 9.8.2.2.

The MBSFN RSRP measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 subframes containing PMCH transmissions) except SCS = 370.37 Hz numerology. For SCS = 370.37 Hz numerology, the MBSFN RSRP measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 symbols containing PMCH transmissions).

The same requirement applies for UE configured with DRX or eDRX_IDLE.

### 4.4.3 MBSFN RSRQ measurements

For UE in RRC_IDLE, the physical layer shall be capable of performing the MBSFN RSRQ measurement [4] within the MBSFN RSRP measurement period and report the measurement, while meeting the MBSFN RSRQ measurement accuracy requirements specified in section 9.8.3. The MBSFN RSRQ measurement logging shall be according to the MBSFN RSRQ measurement report mapping specified in Section 9.8.3.2.

The MBSFN RSRQ measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 subframes containing PMCH transmissions) except SCS = 370.37 Hz numerology. For SCS = 370.37 Hz numerology, the MBSFN RSRQ measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 symbols containing PMCH transmissions).

The same requirement applies for UE configured with DRX or eDRX_IDLE.

### 4.4.4 MCH BLER measurements

The UE physical layer shall be capable of performing and logging the MCH BLER measurement [4] within the MCH BLER measurement period.

The MCH BLER measurement period is equal to the MBSFN logging interval configured by higher layers [2].

The MCH BLER logging shall be according to the MCH BLER measurement report mapping specified in Section 9.8.4.

The same requirement applies for UE configured with DRX or eDRX_IDLE.

## 4.5 Proximity-based Services

### 4.5.1 Introduction

This section contains the requirements for the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery in RRC_IDLE state.

### 4.5.2 Requirements

When a UE in RRC_IDLE state is participating in transmissions and/or reception for ProSe Direct Discovery and/or ProSe Direct Communication, the UE shall meet all the requirements of Section 4.

Note: The UE may need to interrupt ProSe operation in order to meet the requirements of Section 4.

#### 4.5.2.1 Interruptions with ProSe Direct Discovery

A UE capable of ProSe direct discovery in RRC_IDLE state shall not cause any interruption for the reception of paging and system information:

- while switching reception between ProSe Direct Discovery and a serving cell, or
- when receiving ProSe direct discovery signals or
- while switching receiver chain ON/OFF for ProSe Direct Discovery reception if the UE has a dedicated receiver chain for ProSe Direct Discovery

### 4.5.2.2 Interruptions with ProSe Direct Communication

A UE capable of ProSe direct communication in RRC_IDLE state shall not cause any interruption for the reception of paging and system information:

- while switching reception between ProSe Direct Communication and a serving cell, or
- when receiving ProSe direct communication signals, or
- while switching receiver chain ON/OFF for ProSe Direct Communications reception.

### 4.5.2.3 Initiation/Cease of SLSS transmissions with ProSe Direct Discovery

The requirements in this subclause are applicable to a UE capable of ProSe Direct Discovery and SLSS transmission and reception.

The requirements apply when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType19*. The UE shall be capable of measuring the RSRP of the cell used to transmit Prose Direct Discovery announcements and evaluate to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$ as specified in Table 4.5.2.3-1.

**Table 4.5.2.3-1: $T_{evaluate,SLSS}$ with ProSe Direct Discovery**

| DRX cycle length [s] | $T_{evaluate,SLSS}$ [s] (number of DRX cycles) |
|---|---|
| 0.32 | 1.92 (6) |
| 0.64 | 3.84 (6) |
| 1.28 | 7.68 (6) |
| 2.56 | 15.36 (6) |

For the cell used to transmit ProSe Direct Discovery announcements:

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 and RSRQ related side conditions given in Clause 9.1.5.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band are fulfilled.

### 4.5.2.4 Initiation/Cease of SLSS transmissions with ProSe Direct Communication

The requirements in this subclause are applicable to a UE capable of ProSe Direct Communication.

The requirements apply when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType18*. The UE shall be capable of measuring the RSRP of the cell used to transmit ProSe Direct Communication and evaluate to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$ as specified in Table 4.5.2.4-1.

**Table 4.5.2.4-1: $T_{evaluate,SLSS}$ with ProSe Direct Communication**

| DRX cycle length [s] | $T_{evaluate,SLSS}$ [s] (number of DRX cycles) |
|---|---|
| 0.32 | 1.92 (6) |
| 0.64 | 3.84 (6) |
| 1.28 | 7.68 (6) |
| 2.56 | 15.36 (6) |

For the cell used to transmit ProSe Direct Communication:

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 and RSRQ related side conditions given in Clause 9.1.5.1 for a corresponding Band are fulfilled,

- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band are fulfilled.

# 4.6 Cell Selection and Re-selection Requirements for UE category NB1

The NB-IoT applicability of the requirements in section 4.6 is defined in Section 3.6.1.

## 4.6.1 Cell Selection

After a UE has switched on and a PLMN has been selected, the Cell selection process takes place, as described in TS36.304. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

## 4.6.2 Cell Re-selection

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency and inter-frequency cells indicated by the serving NB-IoT cell. For intra-frequency and inter-frequency cells the serving NB-IoT cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS36.304, allowing the UE to limit its measurement activity.

### 4.6.2.1 Measurement and evaluation of serving NB-IoT cell for UE category NB1 in normal coverage

The UE shall measure the NRSRP and NRSRQ level of the serving NB-IoT cell on the anchor carrier and evaluate the cell selection criterion S defined in clause 5.2.3.2 in [1] for the serving NB-IoT cell on the anchor carrier at least every DRX cycle.

The UE shall filter the NRSRP and NRSRQ measurements of the NB-IoT serving cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE is configured for receiving paging on the non-anchor carrier then the UE shall evaluate the cell selection criterion S defined in clause 5.2.3.2a in [1] for the serving NB-IoT cell on non-anchor carrier at least every DRX cycle.

The UE is allowed to measure NRSRP level of the serving NB-IoT cell, assuming that *nrs-NonAnchor-config* is enabled indicated by higher layer defined in clause 10.2.6 TS 36.211 [16], on non-anchor carrier provided that:

- The relaxed monitoring criteria defined in TS 36.304 clause 5.2.4.12 are met,

- Transmit power difference of the signals/channels between anchor- and non-anchor carriers is signalled to the UE, via the existing parameter *nrs-PowerOffsetNonAnchor*, and

- UE is not configured with any positioning measurements.

When UE measures the NRSRP on non-anchor carrier, UE shall compare the measurements from anchor carrier and non-anchor carrier at least once every one hour by the following inequality:

$$| \mathrm{NRSRP}_{\mathrm{anchor}} - (\mathrm{NRSRP}_{\mathrm{non\text{-}anchor}} - \textit{nrs-PowerOffsetNonAnchor}) | \leqslant 10 \text{ dB}$$

where $\mathrm{NRSRP}_{\mathrm{anchor}}$ is the NRSRP measurement on anchor carrier and $\mathrm{NRSRP}_{\mathrm{non\text{-}anchor}}$ is the NRSRP measurement on non-anchor carrier. The measurement for comparison shall use at least 2 measurements for filtering. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2. If the measurement for comparison satisfy the inequality, UE is allowed to perform RRM measurements on the non-anchor carrier until the next comparison takes place or until the relaxed monitoring conditions are no longer met. UE shall perform NRSRP measurement on anchor carrier if the inequality is not satisfied until the next comparison takes place.

When all the conditions for measuring NRSRP on non-anchor carrier are satisfied, the UE shall filter the NRSRP of the serving NB-IoT cell using at least 2 measurements spaced by at least DRX cycle/2, where the measurements used for the filtering may include measurements on anchor carrier and on non-anchor carrier.

If the UE is not configured with eDRX_IDLE cycle and has evaluated according to Table 4.6.2.1-1 in $N_{serv_NB\ -NC}$ consecutive DRX cycles that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities. If the UE is configured with eDRX_IDLE cycle and has evaluated according to Table 4.6.2.1-2 in $N_{serv_NB-NC}$ consecutive DRX cycles within a single PTW that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency and inter-frequency information indicated in the system information during the time T, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1], where T=40 s if the UE is not configured with eDRX_IDLE cycle, and T=MAX(40 s, one eDRX_IDLE cycle) if the UE is configured with eDRX_IDLE cycle.

**Table 4.6.2.1-1: $N_{serv_NB-NC}$**

| DRX cycle length [s] | $N_{serv_NB-IoT-NC}$ [number of DRX cycles] |
|---|---|
| 0.32 | 2 |
| 0.64 | 2 |
| 1.28 | 2 |
| 2.56 | 2 |
| 5.12 | 2 |
| 10.24 | 2 |

**Table 4.6.2.1-2: $N_{serv_NB-NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $N_{serv_NB-IoT-NC}$ [number of DRX cycles] |
|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥2.56 (1) | 2 |
| | 0.64 | ≥2.56 (1) | 2 |
| | 1.28 | ≥5.12 (2) | 2 |
| | 2.56 | ≥7.68 (3) | 2 |
| | 5.12 | ≥12.8 (5) | 2 |
| | 10.24 | ≥23.04 (9) | 2 |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.6.2.1A Measurement and evaluation of serving NB-IoT cell for HD-FDD UE category NB1 in normal coverage when configured with WUS

The UE which supports *wakeUpSignal* [2] shall meet the requirement defined for the DRX cycle length of N*DRX_cycle in Section 4.6.2.1, provided the following conditions are met:

- WUS has been configured in the serving NB-IoT cell using *WUS-Config-NB-r15* [2], and
- The serving cell measurement relaxation is signalled as ***n*** by the network using *numDRX-CycleRelaxed-r15*, and
- Serving cell S criteria is met with at least 2 dB margin.

- the relaxed monitoring criteria for neighbour cells in TS 36.304 [1] clause 5.2.4.12.1 is fulfilled, and

, where the relaxation factor N is given by Table 4.6.2.1A-1. Otherwise the requirements defined for the configured DRX cycle length in Section 4.6.2.1 shall apply.

The UE shall further meet the requirements in section 4.6.2.1 during time period T0 after following occasions:

- after the end of reception of latest paging message, or
- from the moment UE has switched from RRC_CONNECTED state to RRC_IDLE state.

T0 = N*DRX cycle if the UE is not configured with eDRX_IDLE cycle where the value of N specified in Table 4.6.2.1A-1;

T0 = one eDRX IDLE cycle if the UE is configured with eDRX_IDLE cycle;

**Table 4.6.2.1A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value |
|---|---|
| 0.32 | Min(*n* , 8) |
| 0.64 | Min(*n* , 8) |
| 1.28 | Min(***n*** , 8) |
| 2.56 | Min(***n*** , 4) |
| 5.12 | Min(***n*** , 2) |
| 10.24 | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | |

**Table 4.6.2.1A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value | | | | |
|---|---|---|---|---|---|
| | **2.56 ≤ PTW length [s] < 5.12** | **5.12 ≤ PTW length [s] < 7.68** | **7.68 ≤ PTW length [s] < 12.8** | **12.8 ≤ PTW length [s] < 23.04** | **23.04 ≤ PTW length [s]** |
| 0.32 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) | Min(*n* , 8) |
| 0.64 | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) |
| 1.28 | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 2.56 | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 5.12 | N/A | N/A | N/A | 1 | Min(***n*** , 2) |
| 10.24 | N/A | N/A | N/A | N/A | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | | | | | |

### 4.6.2.2 Measurements of intra-frequency NB-IoT cells for UE category NB1 in normal coverage

The UE shall be able to identify new intra-frequency cells and perform NRSRP measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within $T_{detect,NB_Intra_NC}$ when Treselection= 0 . An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

The UE shall measure NRSRP at least every $T_{measure,NB_Intra_NC}$ for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter NRSRP measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NB_Intra\text{-}NC}/2$

The UE shall not consider an NB-IoT neighbour cell in cell reselection if it is indicated as not allowed in the measurement control system information of the serving NB-IoT cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within

$T_{evaluate,NB_intra\text{-}NC}$ when $T_{reselection}$ = 0, provided that the cell is at least XdB better ranked, where 'X' is specified in Table 4.6.2.4-3. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot apply to both serving and non-serving NB-IoT intra-frequency cells.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,NB_Intra_NC}$, $T_{measure,NB_Intra_NC}$ and $T_{evaluate,\ NB_intra_NC}$ are specified in Table 4.6.2.2-1. For UE configured with eDRX_IDLE cycle, $T_{detect,NB_Intra\ -NC}$, $T_{measure,NB_Intra_NC}$ and $T_{evaluate,\ NB_intra\text{-}NC}$ are specified in Table 4.6.2.2-2, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,NB_Intra_NC}$, $T_{measure,NB_Intra_NC}$ and $T_{evaluate,\ NB_intra_NC}$ when multiple PTWs are used.

**Table 4.6.2.2-1 : $T_{detect,NB_Intra\ -NC}$, $T_{measure,NB_Intra\ -NC}$ and $T_{evaluate,\ NB_intra\ -NC}$**

| DRX cycle length [s] | $T_{detect,NB_Intra_NC}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_NB_NC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_intra_NB_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 26 (80) | 1.28 (4) | 5.12 (16) |
| 0.64 | 26 (40) | 1.28 (2) | 5.12 (8) |
| 1.28 | 51 (40) | 1.28 (1) | 6.5 (5) |
| 2.56 | 51 (20) | 2.56 (1) | 7.68 (3) |
| 5.12 | 102 (20) | 5.12 (1) | 10.24 (2) |
| 10.24 | 102 (10) | 10.24 (1) | 20.48 (2) |

**Table 4.6.2.2-2: $T_{detect,NB_Intra_NC}$, $T_{measure,NB_Intra_NC}$ and $T_{evaluate,NB_intra_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Intra\ -NC}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_NC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_intra_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) | $eDRX_cycle_length \times \left\lceil \frac{20}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) | 2.56 (8) |
| | 0.64 | ≥ 2.56 (1) | | 1.28 (2) | 2.56 (4) |
| | 1.28 | ≥ 5.12 (2) | | 1.28 (1) | 2.56 (2) |
| | 2.56 | ≥ 7.68 (3) | | 2.56 (1) | 5.12 (2) |
| | 5.12 | ≥ 12.8 (5) | | 5.12 (1) | 10.24 (2) |
| | 10.24 | ≥ 23.04 (9) | | 10.24 (1) | 20.48 (2) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE's intra-frequency measurement is not required to meet $T_{detect,NB_Intra_NC}$, $T_{measure,NB_Intra_NC}$ and $T_{evaluate,NB_intra_NC}$ as defined in Table 4.6.2.2-1 and Table 4.6.2.2-2.

### 4.6.2.3 Measurement and evaluation of serving NB-IoT cell for UE category NB1 in enhanced coverage

The UE shall measure the NRSRP and NRSRQ level of the serving NB-IoT cell on the anchor carrier and evaluate the cell selection criterion S defined in clause 5.2.3.2 in [1] for the serving NB-IoT cell on the anchor carrier at least every DRX cycle.

The UE shall filter the NRSRP and NRSRQ measurements of the serving NB-IoT cell using at least 4 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE is configured for receiving paging on the non-anchor carrier then the UE shall evaluate the cell selection criterion S defined in clause 5.2.3.2a in [1] for the serving NB-IoT cell on non-anchor carrier at least every DRX cycle.

The UE is allowed to measure NRSRP level of the serving NB-IoT cell, assuming that *nrs-NonAnchor-config* is enabled indicated by higher layer defined in clause 10.2.6 TS 36.211 [16], on non-anchor carrier provided that:

- The relaxed monitoring criteria defined in TS 36.304 clause 5.2.4.12 are met,
- Transmit power difference of the signals/channels between anchor- and non-anchor carriers is signalled to the UE, via the existing parameter *nrs-PowerOffsetNonAnchor*,
- UE is not configured with any positioning measurements.
- *nB* configured by higher layer is not equal to *4T*.

When all the conditions for measuring NRSRP on non-anchor carrier are satisfied, the UE shall filter the NRSRP of the serving NB-IoT cell using at least 4 measurements, where the measurements used for the filtering may include measurements on anchor carrier and on non-anchor carrier.

If the UE is not configured with eDRX_IDLE cycle and has evaluated according to Table 4.6.2.3-1 in $N_{serv_NB_EC}$ consecutive DRX cycles that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities. If the UE is configured with eDRX_IDLE cycle and has evaluated according to Table 4.6.2.3-2 in $N_{serv_NB\ -EC}$ consecutive DRX cycles within a single PTW that the serving NB-IoT cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving NB-IoT cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency and inter-frequency information indicated in the system information during the time T, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1], where T= 80 s if the UE is not configured with eDRX_IDLE cycle, and T=MAX(80 s, one eDRX_IDLE cycle) if the UE is configured with eDRX_IDLE cycle.

**Table 4.6.2.3-1: $N_{serv_NB_EC}$**

| DRX cycle length [s] | $N_{serv_NB\ -EC}$ [number of DRX cycles] |
|---|---|
| 0.32 | 4 |
| 0.64 | 4 |
| 1.28 | 4 |
| 2.56 | 4 |
| 5.12 | 4 |
| 10.24 | 4 |

**Table 4.6.2.3-2: $N_{serv_NB_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $N_{serv_NB_EC}$ [number of DRX cycles] |
|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) | 4 |
| | 0.64 | ≥ 5.12 (2) | 4 |
| | 1.28 | ≥ 7.68 (3) | 4 |

| | | | |
|---|---|---|---|
| | 2.56 | ≥ 12.8 (5) | 4 |
| | 5.12 | ≥ 23.04 (9) | 4 |
| | 10.24 | ≥ 43.52 (17) | 4 |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.6.2.3A Measurement and evaluation of serving NB-IoT cell for HD-FDD UE category NB1 in enhanced coverage when configured with WUS

The UE which supports *wakeUpSignal* [2] shall meet the requirement defined for the DRX cycle length of N*DRX_cycle in Section 4.6.2.3, provided the following conditions are met:

- WUS has been configured in the serving NB-IoT cell using *WUS-Config-NB-r15* [2], and
- The serving cell measurement relaxation is signalled as ***n*** by the network using *numDRX-CycleRelaxed-r15*, and
- Serving cell S criteria is met with at least 2 dB margin.
- the relaxed monitoring criteria for neighbour cells in TS 36.304 [1] clause 5.2.4.12.1 is fulfilled, and

, where the relaxation factor N is given by Table 4.6.2.3A-1. Otherwise the requirements defined for the configured DRX cycle length in Section 4.6.2.3 shall apply.

The UE shall further meet the requirements in section 4.6.2.3 during time period T0 after following occasions:

- after the end of reception of latest paging message, or
- from the moment UE has switched from RRC_CONNECTED state to RRC_IDLE state.

T0 = N*DRX cycle if the UE is not configured with eDRX_IDLE cycle where the value of N specified in Table 4.6.2.3A-1;

T0 = one eDRX IDLE cycle if the UE is configured with eDRX_IDLE cycle;

**Table 4.6.2.3A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value |
|---|---|
| 0.32 | Min(***n*** , 8) |
| 0.64 | Min(***n*** , 8) |
| 1.28 | Min(***n*** , 8) |
| 2.56 | Min(***n*** , 4) |
| 5.12 | Min(***n*** , 2) |
| 10.24 | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | |

**Table 4.6.2.3A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value | | | | | |
|---|---|---|---|---|---|---|
| | **2.56 ≤ PTW length [s] < 5.12** | **5.12≤ PTW length [s] < 7.68** | **7.68 ≤ PTW length [s] < 12.8** | **12.8 ≤ PTW length [s] < 23.04** | **23.04 ≤ PTW length [s] < 43.52** | **43.52 ≤ PTW length [s]** |
| 0.32 | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) | Min(*n* , 8) |
| 0.64 | N/A | 1 | Min(*n* , 2) | Min(*n* , 4) | Min(*n* , 8) | Min(*n* , 8) |
| 1.28 | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 2.56 | N/A | N/A | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5.12 | N/A | N/A | N/A | N/A | 1 | Min(***n*** , 2) |
| 10.24 | N/A | N/A | N/A | N/A | N/A | 1 |
| NOTE: ***n*** is signalled by the network by using *numDRX-CycleRelaxed-r15* defined in TS 36.331 [2]. | | | | | | |

### 4.6.2.4 Measurements of intra-frequency NB-IoT cells for UE category NB1 in enhanced coverage

The UE shall be able to identify new intra-frequency cells and perform NRSRP measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within $T_{detect,NB_Intra_EC}$ when that Treselection= 0 . An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

The UE shall measure NRSRP at least every $T_{measure,NB_Intra_EC}$ for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter NRSRP measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NB_Intra_EC}/2$

The UE shall not consider a NB-IoT neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving NB-IoT cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{evaluate,NB_intra_EC}$ when $T_{reselection}$ = 0, provided that the cell is at least XdB better ranked, where 'X' is specified in Table 4.6.2.4-3. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot apply to both serving and non-serving NB-IoT intra-frequency cells.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,\ NB_intra_EC}$ are specified in Table 4.6.2.4-1. For UE configured with eDRX_IDLE cycle, $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,\ NB_intra_EC}$ are specified in Table 4.6.2.4-2, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,\ NB_intra_EC}$ when multiple PTWs are used.

**Table 4.6.2.4-1 : $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,\ NB_intra_EC}$**

| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | $T_{detect,NB_Intra_EC}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_intra_EC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| **-15≤ Q2 < -6** | 0.32 | 256 (800) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 266 (415) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 532 (415) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 532 (208) | 2.56 (1) | 15.36 (6) |
| | 5.12 | 1063 (208) | 5.12 (1) | 20.48 (4) |
| | 10.24 | 1063 (104) | 10.24 (1) | 30.72 (3) |
| **Q2≥-6** | 0.32 | 26 (80) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 29 (45) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 58 (45) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 59 (23) | 2.56 (1) | 15.36 (6) |
| | 5.12 | 113 (22) | 5.12 (1) | 20.48 (4) |
| | 10.24 | 113 (11) | 10.24 (1) | 30.72 (3) |

**Table 4.6.2.4-2: $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,NB_intra_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Intra_EC}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_intraEC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{[406]}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (406) | 1.28 (4) | 10.24 (32) |
| | 0.64 | ≥12.8 (5) | | 1.28 (2) | 10.24 (16) |
| | 1.28 | ≥15.36 (6) | | 1.28 (1) | 12.8 (10) |
| | 2.56 | ≥17.92 (7) | | 2.56 (1) | 15.36 (6) |
| | 5.12 | ≥23.04 (9) | | 5.12 (1) | 20.48 (4) |
| | 10.24 | ≥33.28 (13) | | 10.24 (1) | 30.72 (3) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

**Table 4.6.2.4-3: Conditions on NSCH Ês/Iot of identified and of the neighbour cell**

| NSCH Ês/Iot of already identified cell including serving cell: Q1 | Neighbouring cell NSCH Ês/Iot: Q2 | Cell Reselection Margin 'X' |
|---|---|---|
| -15≤Q1<-6 | -15≤ Q2 < -6 | 8.3 |
| -15≤Q1<-6 | Q2≥ -6 | 8.3 |
| Q1≥ -6 | Q2≥ -6 | 4 |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE's intra-frequency measurement is not required to meet $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,NB_intra_EC}$ as defined in Table 4.6.2.4-1 and Table 4.6.2.4-2.

### 4.6.2.5 Measurements of inter-frequency NB cells for UE category NB1 in normal coverage

The UE shall be able to identify new inter-frequency cells and perform NRSRP measurements of identified inter-frequency cells if carrier frequency information is provided by the serving NB-IoT cell, even if no explicit neighbour list with physical layer cell identities is provided.

If Srxlev ≤ $S_{nonIntraSearchP}$ then the UE shall search for and measure inter-frequency layers in preparation for possible reselection.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within $P_{carrier}$ * $T_{detect,NB_Inter_NC}$, if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving NB-IoT cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least Y dB, where $P_{carrier}$ is the number of inter-frequency carriers for which carrier frequency information was provided by the serving NB-IoT cell and 'Y' is specified by Table 4.6.2.6-3 (when Q1≥ -6 dB). An inter-frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

The UE shall filter NRSRP measurements of each measured inter-frequency cell using at least [2] measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,\ Inter_NB\text{-}IoT_NC}/2$.

If an inter-frequency cell has been already detected but that has not been reselected to the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 36.304 within $P_{carrier}$ * $T_{evaluate,NB_Inter_NC}$. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot apply to both serving and inter-frequency cells.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,NB_Inter_NC}$, $T_{measure,NB_Inter_NC}$ and $T_{evaluate,\ NB_inter_NC}$ are specified in Table 4.6.2.5-1. For UE configured with eDRX_IDLE cycle, $T_{detect,NB_Inter_NC}$, $T_{measure,NB_Inter_NC}$ and $T_{evaluate,\ NB_inter_NC}$ are specified in Table 4.6.2.5-2, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,NB_Inter_NC}$, $T_{measure,NB_Inter_NC}$ and $T_{evaluate,\ NB_inter_NC}$ when multiple PTWs are used.

**Table 4.6.2.5-1 : $T_{detect,NB_Inter_NC}$, $T_{measure,NB_Inter_NC}$ and $T_{evaluate,NB_Inter_NC}$**

| DRX cycle length [s] | $T_{detect,NB_Inter_NC}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_NC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_Inter_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 26 (80) | 1.28 (4) | 5.12 (16) |
| 0.64 | 26 (40) | 1.28 (2) | 5.12 (8) |
| 1.28 | 51 (40) | 1.28 (1) | 6.5 (5) |
| 2.56 | 51 (20) | 2.56 (1) | 7.68 (3) |
| 5.12 | 102 (20) | 5.12 (1) | 10.24 (2) |
| 10.24 | 102 (10) | 10.24 (1) | 20.48 (2) |

**Table 4.6.2.5-2: $T_{detect,NB_Inter_NC}$, $T_{measure,NB_Inter_NC}$ and $T_{evaluate,\ NB_inter_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Inter_NC}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_NC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_inter_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 2.56 (1) | $eDRX_cycle_length \times \left\lceil \frac{[20]}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) | 2.56 (8) |
| | 0.64 | ≥ 2.56 (1) | | 1.28 (2) | 2.56 (4) |
| | 1.28 | ≥5.12 (2) | | 1.28 (1) | 2.56 (2) |
| | 2.56 | ≥7.68 (3) | | 2.56 (1) | 5.12 (2) |
| | 5.12 | ≥12.8 (5) | | 5.12 (1) | 10.24 (2) |
| | 10.24 | ≥23.04 (9) | | 10.24 (1) | 20.48 (2) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE's inter-frequency measurement is not required to meet $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,NB_intra_EC}$ as defined in Table 4.6.2.5-1 and Table 4.6.2.5-2.

### 4.6.2.6 Measurements of inter-frequency NB-IoT cells for UE category NB1 in enhanced coverage

The UE shall be able to identify new inter-frequency cells and perform NRSRP measurements of identified inter-frequency cells if carrier frequency information is provided by the serving NB-IoT cell, even if no explicit neighbour list with physical layer cell identities is provided.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within $P_{carrier}$ * $T_{detect,NB_Inter_EC}$. An inter-frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

The UE shall not cause any interruption to the paging reception and acquisition of SI while performing measurement on serving or any neighbor cells.

The UE shall filter NRSRP measurements of each measured inter-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NB_Inter_EC}/2$.

If an inter-frequency cell has been already detected but that has not been reselected to the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 36.304 within $P_{carrier}$ * $T_{evaluate,NB_Inter_EC}$. When evaluating cells for reselection, the side conditions for NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot apply to both serving and inter-frequency NB-IoT cells.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is better ranked than the serving NB-IoT cell, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For a UE not configured with eDRX_IDLE cycle, $T_{detect,NB_Inter_EC}$, $T_{measure,NB_Inter_EC}$ and $T_{evaluate,\ NB_inter_EC}$ are specified in Table 4.6.2.6-1. For UE configured with eDRX_IDLE cycle, $T_{detect,NB_Inter_EC}$, $T_{measure,NB_Inter_EC}$ and $T_{evaluate,\ NB_inter_EC}$ are specified in Table 4.6.2.6-2 for the UE in enhanced coverage, where the requirements apply provided that the serving NB-IoT cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,NB_Inter_EC}$, $T_{measure,NB_Inter_EC}$ and $T_{evaluate,\ NB_inter_EC}$ when multiple PTWs are used.

**Table 4.6.2.6-1 : $T_{detect,NB_Inter_EC}$, $T_{measure,NB_Inter_EC}$ and $T_{evaluate,NB_Inter_EC}$**

| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | $T_{detect,NB_Inter_EC}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_EC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_Inter_EC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| -15≤ Q2 < -6 | 0.32 | 256 (800) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 266 (415) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 532 (415) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 532 (208) | 2.56 (1) | 15.36 (6) |
| | 5.12 | 1063 (208) | 5.12 (1) | 20.48 (4) |
| | 10.24 | 1063 (104) | 10.24 (1) | 30.72 (3) |
| Q2≥-6 | 0.32 | 26 (80) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 29 (45) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 58 (45) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 59 (23) | 2.56 (1) | 15.36 (6) |
| | 5.12 | 113 (22) | 5.12 (1) | 20.48 (4) |
| | 10.24 | 113 (11) | 10.24 (1) | 30.72 (3) |

**Table 4.6.2.6-2: $T_{detect,NB_Inter_EC}$, $T_{measure,NB_Inter_EC}$ and $T_{evaluate,\ NB_inter_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Inter_EC}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_EC}$ [s] (number of DRX cycles) | $T_{evaluate,NB_interEC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{[406]}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (406) | 1.28 (4) | 10.24 (32) |
| | 0.64 | ≥12.8 (5) | | 1.28 (2) | 10.24 (16) |
| | 1.28 | ≥15.36 (6) | | 1.28 (1) | 12.8 (10) |
| | 2.56 | ≥17.92 (7) | | 2.56 (1) | 15.36 (6) |
| | 5.12 | ≥23.04 (9) | | 5.12 (1) | 20.48 (4) |
| | 10.24 | ≥33.28 (13) | | 10.24 (1) | 30.72 (3) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

**Table 4.6.2.6-3: Conditions on NSCH Ês/Iot of identified and of the neighbour cell**

| NSCH Ês/Iot of already identified cell including serving cell: Q1 | Neighbouring cell NSCH Ês/Iot: Q2 | Cell Reselection Margin 'Y' |
|---|---|---|
| -15≤Q1<-6 | -15≤ Q2 < -6 | 9.3 |
| -15≤Q1<-6 | Q2≥-6 | 9.3 |
| Q1≥ -6 | Q2≥-6 | 5 |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 [1] are fulfilled then the UE's inter-frequency measurement is not required to meet $T_{detect,NB_Intra_EC}$, $T_{measure,NB_Intra_EC}$ and $T_{evaluate,NB_intra_EC}$ as defined in Table 4.6.2.6-1 and Table 4.6.2.6-2.

### 4.6.2.7 Maximum interruption in paging reception in normal coverage

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception. When the UE is configured with eDRX_IDLE cycle, the UE shall not miss any paging in a PTW provided the paging is sent in at least 2 DRX cycles before the end of that PTW.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving NB-IoT cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI\text{-}NB1\text{-}NC}$ + 100 ms.

### 4.6.2.7A Maximum interruption in paging reception in enhanced coverage

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception. When the UE is configured with eDRX_IDLE cycle, the UE shall not miss any paging in a PTW provided the paging is sent in at least 2 DRX cycles before the end of that PTW.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving NB-IoT cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI\text{-}NB1\text{-}EC}$ + 100 ms.

### 4.6.2.8 UE measurement capability

For idle mode cell re-selection purposes, the UE shall be capable of monitoring at least:

- Depending on UE capability, an intra-frequency carrier.
- Depending on UE capability, at least 2 inter-frequency carriers.

### 4.6.2.9 WUS receptions for NB1

This clause contains requirements on the UE regarding WUS reception provided that the WUS has been configured in the serving NB-IoT cell.

The UE shall be capable of receiving the WUS signals of the serving NB-IoT cell provided that the minimum number of repetitions configured in the NB-IoT serving cell is according to Table 4.6.2.9-1 for normal coverage and Table 4.6.2.9-2 for enhanced coverage.

The requirements in this clause also apply when UE is configured to monitor 2 sequences within the same resource.

**Table 4.6.2.9-1: Conditions for WUS reception for UE normal coverage level**

| DRX cycle length [s] | Required number of repetition of WUS signal with 1 transmit antenna | Required number of repetition of WUS signal with 2 transmit antennas |
|---|---|---|
| ≤ 5.12 | 64 | 32 |

| | | |
|---|---|---|
| >5.12 | 128 | 64 |

**Table 4.6.2.9-2: Conditions for WUS reception for UE enhanced coverage level**

| DRX cycle length [s] | Required number of repetition of WUS signal with 1 transmit antenna | Required number of repetition of WUS signal with 2 transmit antennas |
|---|---|---|
| ≤ 5.12 | 128 | 64 |
| > 5.12 | 256 | 128 |

## 4.6.3 Requirements for transmission using preconfigured uplink resources for UE category NB1

### 4.6.3.1 Introduction

The requirements in this clause are applicable when the UE is configured with timing alignment (TA) validation using *pur-NRSRP-ChangeThreshold-r16* for transmitting in uplink using preconfigured uplink resources (PUR) as specified in [TS 36.331].

### 4.6.3.2 Requirements on UE synchronization for transmission using PUR

The requirements in this clause are applicable for the UE in normal coverage or in enhanced coverage.

The UE is allowed to transmit using the preconfigured uplink resources provided that the UE is synchronized towards the serving cell prior to transmission. If the UE is not able to obtain the synchronization towards the serving cell then the UE shall drop the PUR transmission. The UE determines the PUR transmission occasion according to the received PUR configuration [TS 36.331].

### 4.6.3.3 Requirements on TA validation for transmission using PUR

When only *NRSRP-ChangeThresh-NB-r16* [TS 36.331] is configured for TA validation based on NRSRP change criterion according to clause 5.3.3.19 in [TS 36.331], with or without other TA validation criteria, the UE is allowed to transmit using PUR using the timing derived using the latest available $N_{TA}$ value as specified in subclause 7.20 provided that

- the first NRSRP ($NRSRP_1$) measurement and the second NRSRP ($NRSRP_2$) measurements used in the TA validation are valid measurements and,
- timing alignment validation for transmission using PUR is valid according to the validation criteria in section 5.3.3.19 in [TS 36.331] for all configured TA validation criteria.

$NRSRP_1$ is considered valid provided that the following condition is met when in normal coverage:

$$(T1 - \min(800\ ms, N \times DRX\ cycle)) \leq T1' \leq (T1 + \min(800\ ms, N \times DRX\ cycle))$$

$NRSRP_1$ is considered valid provided that the following condition is met when in enhanced coverage:

$$(T1 - \min(1600\ ms, N \times DRX\ cycle)) \leq T1' \leq (T1 + \min(1600\ ms, N \times DRX\ cycle))$$

$NRSRP_2$ is considered valid provided that the following condition is met when in normal coverage:

$$T2 - \min(800\ ms, N \times DRX\ cycle) \leq T2' \leq T2$$

$NRSRP_2$ is considered valid provided that the following condition is met when in enhanced coverage:

$$T2 - \min(1600\ ms, N \times DRX\ cycle) \leq T2' \leq T2$$

If at least one of $NRSRP_1$ and $NRSRP_2$ is considered to be invalid based on the above conditions then the UE shall not validate the PUR using $NRSRP_1$ and $NRSRP_2$ and shall not transmit using PUR.

Where

- T1 is the time when the latest $N_{TA}$was obtained by the UE via Timing Advance Command MAC control element or NPDCCH for transmission on PUR,

- T1' is the time when the UE has completed $NRSRP_1$,
- T2 is the time when the UE performs TA validation defined in clause 5.3.3.19 of TS 36.331 [2] for transmission using PUR,
- T2' is the time when the UE has completed $NRSRP_2$.
- N is applicable only if relaxed serving cell monitoring as defined in clause 4.6.2.1A for normal coverage or 4.6.2.3A for enhanced coverage is in use. Otherwise, N=1.
- For normal coverage, N is the relaxation factor and is given by Table 4.6.2.1A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.6.2.1A-2 if the UE is configured with eDRX_IDLE if relaxed serving cell monitoring as defined in clause 4.6.2.1A is in use.
- For enhanced coverage, N is the relaxation factor and is given by Table 4.6.2.3A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.6.2.3A-2 if the UE is configured with eDRX_IDLE cycle if relaxed serving cell monitoring as defined in clause 4.6.2.3A is in use.

# 4.7 Cell Selection and Re-selection Requirements for UE category M1

The UE category M1 applicability of the requirements in section 4.7 is defined in Section 3.6.1. The requirements in this subclause apply if category M1 UE is in normal and enhanced coverage area of the serving cell. The category M1 normal and enhanced coverge applicability of the requirements is defined in section 3.6.1.

## 4.7.1 Cell Selection

The requirements defined in section 4.1 apply for this section.

## 4.7.2 Cell Re-selection

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency and inter-frequency cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS36.304, allowing the UE to limit its measurement activity.

If the UE is in normal coverage as defined in section 3.6.1, the requirements in section 4.7.2.1 apply. If the UE is in enhanced coverage as defined in section 3.6.1, the requirements in section 4.7.2.2 apply.

### 4.7.2.1 Cell Re-selection requirements for UE category M1 in normal coverage

#### 4.7.2.1.1 Measurement and evaluation of serving cell for UE category M1 in normal coverage

The requirements in this subclause apply if UE is in the normal coverage area of the serving cell. The UE is considered to be in normal coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The requirements defined in section 4.2.2.1 apply for this section.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- Serving cell RSS are available within the paging MPDCCH narrowband for $N_{serv}$ successive DRX cycles and the last subframe of the RSS occasion is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH narrowband, and
- RSS power offset ($P_{RSS}$) with respect to CRS as defined in *RSS-Config* [2], where $P_{RSS} \geq 0$ dB, and
- UE is not configured with eDRX_IDLE cycle, and DRX cycle length is 0.32s or 0.64s.

- $N_{serv}$ defined in Table 4.7.2.1.1-1 applies if serving cell is measured based on RSS.

**Table 4.7.2.1.1-1: $N_{serv}$**

| DRX cycle length [s] | $N_{serv}$ [number of DRX cycles] |
|---|---|
| 0.32 | 3 |
| 0.64 | 3 |
| 1.28 | N/A |
| 2.56 | N/A |

If UE performs RSRP measurement based on RSS for serving cell, it is not expected to perform RSRP measurement based on CRS on that serving cell.

### 4.7.2.1.1A Relaxed measurement and evaluation of serving cell for UE category M1 in normal coverage

The UE which supports *wakeUpSignal-r15* or *wakeUpSignal-TDD-r15* shall meet the requirement defined for the DRX cycle length of N*DRX_cycle in Section 4.7.2.1.1, provided the following conditions are met:

- WUS has been configured in the serving cell using *WUS-Config-r15*, and
- The serving cell measurement relaxation is signalled by the network using *num-DRX-CyclesRelaxed*, and
- Serving cell S criteria is met with at least 2 dB margin.
- The relaxed monitoring criteria for neighbour cells in TS 36.304 [1] clause 5.2.4.12.1 is fulfilled,

Otherwise the requirements defined for the configured DRX cycle length in Section 4.7.2.1.1 shall apply.

The UE shall further meet the requirements in section 4.7.2.1.1 during time period T0 after following occasions:

- after the end of reception of latest paging message, or
- from the moment UE has switched from RRC_CONNECTED state to RRC_IDLE state.

T0 = N*DRX cycle if the UE is not configured with eDRX_IDLE cycle and T0 = one eDRX IDLE cycle if the UE is configured with eDRX_IDLE cycle.

The relaxation factor N is given by Table 4.7.2.1.1A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.7.2.1.1A-2 if the UE is configured with eDRX_IDLE cycle.

**Table 4.7.2.1.1A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value |
|---|---|
| 0.32 | Min(***n*** , 32) |
| 0.64 | Min(***n*** , 16) |
| 1.28 | Min(***n*** , 8) |
| 2.56 | Min(***n*** , 4) |
| NOTE: ***n*** is signalled by the network by using *num-DRX-CyclesRelaxed* defined in TS 36.331 [2]. | |

**Table 4.7.2.1.1A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value | | |
|---|---|---|---|
| | 1.28 ≤ PTW length [s] < 2.56 | 2.56 ≤ PTW length [s] < 5.12 | 5.12 ≤ PTW length [s] |
| 0.32 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 0.64 | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 1.28 | N/A | 1 | Min(***n*** , 2) |
| 2.56 | N/A | N/A | 1 |
| NOTE: ***n*** is signalled by the network by using *num-DRX-CyclesRelaxed* defined in TS 36.331 [2]. | | | |

#### 4.7.2.1.2 Measurements of intra-frequency cells for UE category M1 in normal coverage

The requirements in this subclause apply if UE is in the normal coverage area of the serving cell. The UE is considered to be in normal coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall be able to identify new intra-frequency cells and perform RSRP and RSRQ measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- the UE supports measuring neighbour cell RSS on the same paging MPDCCH narrowband, and RSS of the measured cell are available within the paging MPDCCH narrowband for $T_{evaluate,\ E\text{-}UTRAN_Intra_NC_RSS}$ successive DRX cycles, and the last subframe of the RSS occasion of the measured cell is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH, or

- the UE does not support measuring neighbour cell RSS on the same paging MPDCCH narrowband, and RSS of the measured cell are available within the same RB location as the RSS RB location of the serving cell for $T_{evaluate,\ E\text{-}UTRAN_Intra_NC_RSS}$ successive DRX cycles, and the last subframe of the RSS occasion of the measured cell is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH, and

- UE is not configured with eDRX_IDLE cycle, and

- RSS power offset ($P_{RSS}$) with respect to CRS as defined in *rss-MeasPowerBias* [2], where $P_{RSS} \geq 0$ dB.

If UE performs RSRP measurement based on RSS on detected intra-frequency cell, it is not expected to perform RSRP measurement based on CRS on that measured cell. UE shall compensate the RSS power offset ($P_{RSS}$) with respect to CRS when derving the RSRP measurement based on RSS.

For performing RSRP measurement based on RSS on detected intra-frequency cells, UE assumes BL/CE DL subframe configuration of each neighbor cell is same as serving cell. The requirements for RSRP measurement based on RSS for a neighbour cell apply provided that BL/CE DL subframe configuration of the neighbor cell is same as serving cell.

Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the RSS transmission of each neighbor cell starts in the radio frame within a window of +/- 5ms around the calculated radio frame offset of the serving cell.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within $T_{detect,EUTRAN_Intra_NC}$ when that Treselection= 0 . An intra frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.3 for a corresponding Band.

The UE shall measure RSRP and RSRQ at least every $T_{measure,EUTRAN_Intra_NC}$ for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter RSRP and RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Intra_NC}/2$.

The UE shall not consider a E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{evaluate,E\text{-}UTRAN_Intra_NC}$ when $T_{reselection} = 0$, provided that the cell is at least 4dB better ranked for Cat-M1 UE. For neigbor cell measured with RSS, the $T_{evaluate,E\text{-}UTRAN_Intra_NC_RSS}$ as defined in Table 4.7.2.1.2-1 applies.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is better ranked than the serving cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_Intra_NC}$ are specified in Table 4.7.2.1.2-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_Intra_NC}$ are specified in Table 4.7.2.1.2-2, where the requirements apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_Intra_NC}$ when multiple PTWs are used.

**Table 4.7.2.1.2-1 : $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_Intra_NC}$**

| DRX cycle length [s] | $T_{detect,EUTRAN_Intra_NC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_NC_RSS}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) | 3.84 (12) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) | 3.84 (6) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | 7.68 (3) |
| NOTE 1: Void | | | | |

**Table 4.7.2.1.2-2: $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,E\text{-}UTRAN_Intra_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Intra_NC}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{measure,EUTRAN_Intra_NC}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluate,E\text{-}UTRAN_intra_NC}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44262 1.44 | 0.32 | ≥1.28 (1) | $eDRX_cycle_length \times \frac{23}{\lceil PTW / DRX_cycle_length \rceil}$ (23) | 0.32 (1) | 0.64 (2) |
| | 0.64 | ≥1.28 (1) | | 0.64 (1) | 1.28 (2) |
| | 1.28 | ≥2.56 (2) | | 1.28 (1) | 2.56 (2) |
| | 2.56 | ≥5.12 (4) | | 2.56 (1) | 5.12 (2 ) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: Void<br>NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise. | | | | | |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 of TS 36.304 [1] are fulfilled then the UE's intra-frequency measurement is not required to meet $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,E\text{-}UTRAN_intra_NC}$ as defined in Table 4.7.2.1.2-1 and Table 4.7.2.1.2-2.

### 4.7.2.1.3 Measurements of inter-frequency cells for UE category M1 in normal coverage

The requirements in this subclause apply if UE is in the normal coverage area of the serving cell. The UE is considered to be in normal coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall be able to identify new inter-frequency cells and perform RSRP or RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided. The UE shall not cause any interruption to the paging reception and acquisition of SI while performing measurement on serving or any neighbor cells.

If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within $K_{carrier}$*$T_{detect,EUTRAN_Inter_NC}$, if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 8 dB for reselections based on ranking or 8 dB for RSRP reselections based on absolute priorities or 5.5 dB for RSRQ reselections based on absolute priorities. $K_{carrier}$ is the number of inter-frequency carriers in the neighbour cell list. An inter frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.8 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,E-UTRAN_Inter_NC}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure RSRP or RSRQ at least every $K_{carrier}$*$T_{measure,EUTRAN_Inter_NC}$ for identified lower or equal priority inter-frequency cells. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter RSRP or RSRQ measurements of each measured higher, lower and equal priority inter-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Inter_NC}/2$.

The UE shall not consider a E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 36.304 within $K_{carrier}$*$T_{evaluate,E-UTRAN_Inter_NC}$, when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 7 dB for reselections based on ranking or 7dB for RSRP reselections based on absolute priorities or 5dB for RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is better ranked than the serving cell, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E-UTRAN_Inter_NC}$ are specified in Table 4.7.2.1.3-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E-UTRAN_Inter_NC}$ are specified in Table 4.7.2.1.3-2. Additionally, the requirements in Table 4.7.2.1.3-2 apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E-UTRAN_Inter_NC}$ when multiple PTWs are used.

**Table 4.7.2.1.3-1 : $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,E-UTRAN_Inter_NC}$**

| DRX cycle length [s] | $T_{detect,EUTRAN_Inter_NC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Inter_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E-UTRAN_Inter_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) |

| | | | |
|---|---|---|---|
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |

**Table 4.7.2.1.3-2: $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Inter_NC}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{measure,EUTRAN_Inter_NC}$ [s] (number of DRX or eDRX cycles Note 3) | $T_{evaluate,E\text{-}UTRAN_inter_NC}$ [s] (number of DRX or eDRX cycles Note 3) |
|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | $eDRX_cycle_length \times \left\lceil \frac{23}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (23) | 0.32 (1) | (2) |
| | 0.64 | ≥1.28 (1) | | 0.64 (1) | (2) |
| | 1.28 | ≥1.28 (1) | | 1.28 (1) | (2) |
| | 2.56 | ≥2.56 (2) | | 2.56 (1) | (2) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For higher priority cells, a UE may optionally use a shorter value for $T_{measure,EUTRAN_Inter_NC}$, which shall not be less than Max(0.64 s, one DRX cycle).

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 of TS 36.304 [1] are fulfilled then the UE's inter-frequency measurement is not required to meet $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,E\text{-}UTRAN_inter_NC}$ as defined in Table 4.7.2.1.3-1 and Table 4.7.2.1.3-2.

### 4.7.2.1.4 Maximum allowed layers for multiple monitoring for UE category M1 in normal coverage

The UE category M1 in normal coverage shall be capable of monitoring at least:

- Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 2 TDD E-UTRA inter-frequency carriers.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 5 carrier frequency layers, which include one serving carrier frequency and any of the above defined combination of E-UTRA FDD inter-frequency and E-UTRA TDD inter-frequency layers.

### 4.7.2.1.5 Maximum interruption in paging reception for Category M1 UEs in normal coverage

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception. When the UE is configured with eDRX_IDLE cycle, the UE shall not miss any paging in a PTW provided the paging is sent in at least 2 DRX cycles before the end of that PTW.

At intra-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency cell for paging reception. The interruption time shall not exceed $T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ + 50 ms.

$T_{SI-EUTRA-M1-NC}$ is the time required for receiving all the relevant system information data, which include MIB and relavant SIB, according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for an E-UTRAN cell.

These requirements assume normal coverage radio conditions and do not take into account cell re-selection failure.

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.7.2.2 Cell Re-selection requirements for UE category M1 in enhanced coverage

#### 4.7.2.2.1 Measurement and evaluation of serving cell for UE category M1 in enhanced coverage

The requirements in this subclause apply if UE is in the enhanced coverage area of the serving cell. The UE is considered to be in enhanced coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- Serving cell RSS are available within the paging MPDCCH narrowband for $N_{serv}$ successive DRX cycles and the last subframe of the RSS occasion is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH narrowband, and
- RSS power offset ($P_{RSS}$)with respect to CRS as defined in *RSS-Config* [2], where $P_{RSS} \geq 0$ dB, and
- UE is not configured with eDRX_IDLE cycle, and DRX cycle length is 0.32s or 0.64s.

If UE performs RSRP measurement based on RSS for serving cell, it is not expected to perform RSRP measurement based on CRS on that serving cell.

The UE shall filter the RSRP and RSRQ measurements of the serving cell using at least 4 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE is not configured with eDRX_IDLE cycle and has evaluated according to Table 4.7.2.2.1-1 in $N_{serv_EC}$ consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE is configured with eDRX_IDLE cycle and has evaluated according to Table 4.7.2.2.1-2 in $N_{serv_EC}$ consecutive DRX cycles within a single PTW that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information during the time T, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1], where T=20 s if the UE is not configured with eDRX_IDLE cycle, and T=MAX(20 s, one eDRX_IDLE cycle) if the UE is configured with eDRX_IDLE cycle.

**Table 4.7.2.2.1-1: $N_{serv_EC}$**

| DRX cycle length [s] | $N_{serv_EC}$ [number of DRX cycles] |
|---|---|
| 0.32 | 8 |
| 0.64 | 8 |

| | |
|---|---|
| 1.28 | 4 |
| 2.56 | 4 |

**Table 4.7.2.2.1-2: $N_{serv_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $N_{serv}$ [number of DRX or eDRX cycles Note 3] |
|---|---|---|---|
| 5.12 | N/A | N/A | 4 |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | 4 |
| | 0.64 | ≥2.56 (2) | 4 |
| | 1.28 | ≥5.12 (4) | 4 |
| | 2.56 | ≥10.24(8) | 4 |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].<br>NOTE 3: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise. | | | |

$N_{serv_EC}$ defined in Table 4.7.2.2.1-3 applies if serving cell is measured based on RSS.

**Table 4.7.2.2.1-3: $N_{serv_EC}$**

| DRX cycle length [s] | $N_{serv}$ [number of DRX cycles] |
|---|---|
| 0.32 | 5 |
| 0.64 | 5 |
| 1.28 | N/A |
| 2.56 | N/A |

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.7.2.2.1A Relaxed measurement and evaluation of serving cell for UE category M1 in enhaned coverage

The UE which supports *wakeUpSignal-r15* or *wakeUpSignal-TDD-r15* shall meet the requirement defined for the DRX cycle length of N*DRX_cycle in Section 4.7.2.2.1, provided the following conditions are met:

- WUS has been configured in the serving cell using *WUS-Config-r15*, and
- The serving cell measurement relaxation is signalled by the network using *num-DRX-CyclesRelaxed*, and
- Serving cell S criteria is met with at least 2 dB margin.
- The relaxed monitoring criteria for neighbour cells in TS 36.304 [1] clause 5.2.4.12.1 is fulfilled,

Otherwise the requirements defined for the configured DRX cycle length in Section 4.7.2.2.1 shall apply.

The UE shall further meet the requirements in section 4.7.2.2.1 during time period T0 after following occasions:

- after the end of reception of latest paging message, or
- from the moment UE has switched from RRC_CONNECTED state to RRC_IDLE state.

T0 = N*DRX cycle if the UE is not configured with eDRX_IDLE cycle and T0 = one eDRX IDLE cycle if the UE is configured with eDRX_IDLE cycle.

The relaxation factor N is given by Table 4.7.2.2.1A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.7.2.2.1A-2 if the UE is configured with eDRX_IDLE cycle.

**Table 4.7.2.2.1A-1: The relaxation factor N for a UE not configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value |
|---|---|
| 0.32 | Min(***n*** , 32) |
| 0.64 | Min(***n*** , 16) |
| 1.28 | Min(***n*** , 8) |
| 2.56 | Min(***n*** , 4) |
| NOTE: ***n*** is signalled by the network by using *num-DRX-CyclesRelaxed* defined in TS 36.331 [2]. | |

**Table 4.7.2.2.1A-2: The relaxation factor N for a UE configured with eDRX IDLE cycle**

| DRX cycle length [s] | Value | | | |
|---|---|---|---|---|
| | 1.28 ≤ PTW length [s] < 2.56 | 2.56 ≤ PTW length [s] < 5.12 | 5.12 ≤ PTW length [s] < 10.24 | 10.24 ≤ PTW length [s] |
| 0.32 | 1 | Min(***n*** , 2) | Min(***n*** , 4) | Min(***n*** , 8) |
| 0.64 | N/A | 1 | Min(***n*** , 2) | Min(***n*** , 4) |
| 1.28 | N/A | N/A | 1 | Min(***n*** , 2) |
| 2.56 | N/A | N/A | N/A | 1 |
| NOTE: ***n*** is signalled by the network by using *num-DRX-CyclesRelaxed* defined in TS 36.331 [2]. | | | | |

### 4.7.2.2.2 Measurements of intra-frequency cells for UE category M1 in enhanced coverage

The requirements in this subclause apply if UE is in the enhanced coverage area of the serving cell. The UE is considered to be in enhanced coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall be able to identify new intra-frequency cells and perform RSRP and RSRQ measurements of identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities. The UE shall not cause any interruption to the paging reception and acquisition of SI while performing measurement on serving or any neighbor cells.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- the UE supports measuring neighbour cell RSS on the same paging MPDCCH narrowband, and RSS of the measured cell are available within the paging MPDCCH narrowband for $T_{evaluate,\ E\text{-}UTRAN_Intra_EC_RSS}$ successive DRX cycles, and the last subframe of the RSS occasion of the measured cell is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH, or

- the UE does not support measuring neighbour cell RSS on the same paging MPDCCH narrowband, and RSS of the measured cell are available within the same RB location as the RSS RB location of the serving cell for $T_{evaluate,\ E\text{-}UTRAN_Intra_EC_RSS}$ successive DRX cycles, and the last subframe of the RSS occasion of the measured cell is in the window [n-5, n-1] where n is the first subframe of paging MPDCCH, and

- UE is not configured with eDRX_IDLE cycle, and

- RSS power offset ($P_{RSS}$) with respect to CRS as defined in *rss-MeasPowerBias* [2], where $P_{RSS} \geq 0$ dB.

If UE performs RSRP measurement based on RSS on detected intra-frequency cell, it is not expected to perform RSRP measurement based on CRS on that measured cell. UE shall compensate the RSS power offset ($P_{RSS}$) with respect to CRS when derving the RSRP measurement based on RSS.

For performing RSRP measurement based on RSS on detected intra-frequency cells, UE assumes BL/CE DL subframe configuration of each neighbor cell is same as serving cell. The requirements for RSRP measurement based on RSS for a neighbour cell apply provided that BL/CE DL subframe configuration of the neighbor cell is same as serving cell.

Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the RSS transmission of each neighbor cell starts in the radio frame within a window of +/- 5ms around the calculated radio frame offset of the serving cell.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 within $T_{detect,EUTRAN_Intra_EC}$ when that Treselection= 0 . An intra-frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.3 for a corresponding Band.

The UE shall measure RSRP and RSRQ at least every $T_{measure,EUTRAN_Intra_EC}$ for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter RSRP and RSRQ measurements of each measured intra-frequency cell using at least 4 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Intra_EC}/2$.

The UE shall not consider an E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{evaluate,E\text{-}UTRAN_intra_EC}$ when $T_{reselection} = 0$, provided that the cell is at least 5dB better ranked. For neigbor cell measured with RSS, the $T_{evaluate,E\text{-}UTRAN_Intra_EC_RSS}$ as defined in Table 4.7.2.2.2-1 and Table 4.7.2.2.2-2 applies.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is better ranked than the serving cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Intra_EC,}$ $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_intra_EC}$ are specified in Table 4.7.2.2.2-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Intra_EC,}$ $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_intra_EC}$ are specified in Table 4.7.2.2.2-2. Additionally, the requirements in Table 4.7.2.2.2-2 apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Intra_EC,}$ $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_intra_EC}$ when multiple PTWs are used.

**Table 4.7.2.2.2-1 : $T_{detect,EUTRAN_Intra_EC,}$ $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_intra_EC}$**

| SCH Ês/Iot of neighboring cell: Q2 [dB] | DRX cycle length [s] | $T_{detect,EUTRAN_Intra_EC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_EC_RSS}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| **-15≤ Q2 < -6** | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| | 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| | 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| | 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| **Q2≥-6** | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| | 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| | 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| | 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| NOTE 1: Void | | | | | |

**Table 4.7.2.2.2-2: $T_{detect,EUTRAN_Intra_EC}$, $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_intra_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Intra_EC}$ [s] (number *N* of DRX or eDRX cycles Note 5) for neighboring cell with SCH Es/IoT: -15≤ Q2 < -6 [dB] | $T_{detect,EUTRAN_Intra_EC}$ [s] (number *N* of DRX or eDRX cycles Note 5) for neighboring cell with SCH Es/IoT: Q2≥-6 [dB] | $T_{measure,EUTRAN_Intra_EC}$ [s] (number *N* of DRX or eDRX cycles Note 5) | $T_{evaluate,E\text{-}UTRAN_intra_EC}$ [s] (number *N* of DRX or eDRX cycles Note 5) | $T_{evaluate,E\text{-}UTRAN_intra_EC_RSS}$ [s] (number *N* of DRX or eDRX cycles Note 5) |
|---|---|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 2078.72 (406) | 133.12 (26) | 5.12 (1) | 30.72 (6) | 25.6 (5) |
| 10.24 ≤ eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (406) | Note 3 (26) | 0.32 (1) | Note 3 (6) | Note 3 (5) |
| | 0.64 | ≥1.28 (1) | | | 0.64 (1) | Note 3 (6) | Note 3 (5) |
| | 1.28 | ≥2.28 (1) | | | 1.28 (1) | Note 3 (6) | Note 3 (5) |
| | 2.56 | ≥2.56 (2) | | | 2.56 (1) | Note 3 (6) | Note 3 (5) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: The detection period and the evaluation period depend on the number *N* of DRX cycles and are calculated according to the formula below:

$$eDRX\ _cycle_length \times \left\lceil \frac{N}{\lceil PTW\ /\ DRX\ _cycle_length \rceil} \right\rceil .$$

NOTE 4: Void
NOTE 5: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 of TS 36.304 [1] are fulfilled then the UE's intra-frequency measurement is not required to meet $T_{detect,EUTRAN_Intra_EC}$, $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,E\text{-}UTRAN_intra_EC}$ as defined in Table 4.7.2.2.2-1 and Table 4.7.2.2.2-2.

### 4.7.2.2.3 Measurements of inter-frequency cells for UE category M1 in enhanced coverage

The requirements in this subclause apply if UE is in the enhanced coverage area of the serving cell. The UE is considered to be in enhanced coverage area of serving cell according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot of the serving cell defined in Annex B.1.3 for a corresponding Band.

The UE shall be able to identify new inter-frequency cells and perform RSRP or RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided. The UE shall not cause any interruption to the paging reception and acquisition of SI while performing measurement on serving or any neighbor cells.

If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.

If Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS36.304 within $K_{carrier}$*$T_{detect,EUTRAN_Inter_EC}$, if at least carrier frequency information is provided for inter-frequency

neighbour cells by the serving cells when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 8 dB for reselections based on ranking. $K_{carrier}$ is the number of inter-frequency carriers in the neighbour cell list. An inter frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.8 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,E-UTRAN_Inter_EC}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure RSRP or RSRQ at least every $K_{carrier}$*$T_{measure,EUTRAN_Inter_EC}$ for identified lower or equal priority inter-frequency cells. If the UE detects on a E-UTRA carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter RSRP or RSRQ measurements of each measured higher, lower and equal priority inter-frequency cell using at least 4 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_Inter_EC}/2$.

The UE shall not consider a E-UTRA neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 36.304 within $K_{carrier}$*$T_{evaluate,E-UTRAN_Inter_EC}$, when $T_{reselection}$ = 0 provided that the reselection criteria is met by a margin of at least 8 dB for reselections based on ranking.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is better ranked than the serving cell, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

For UE not configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E-UTRAN_inter_EC}$ are specified in Table 4.7.2.2.3-1. For UE configured with eDRX_IDLE cycle, $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E-UTRAN_inter_EC}$ are specified in Table 4.7.2.2.3-3. Additionally, the requirements in Table 4.7.2.2.3-3 apply provided that the serving cell is configured with eDRX_IDLE and is the same in all PTWs during any of $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E-UTRAN_inter_EC}$ when multiple PTWs are used.

**Table 4.7.2.2.3-1: $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,E-UTRAN_Inter_EC}$**

| SCH Ês/Iot of neighboring cell: Q2 [dB] | DRX cycle length [s] | $T_{detect,EUTRAN_Inter_EC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Inter_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E-UTRAN_inter_EC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| **-15≤ Q2 < -6** | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) |
| **Q2≥-6** | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) |
| | 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) |
| | 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) |
| | 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) |

**Table 4.7.2.2.3-2: Void**

**Table 4.7.2.2.3-3: $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | $T_{detect,EUTRAN_Inter_EC}$ [s] (number of DRX or eDRX cycles Note 4) for neighboring cell with SCH Es/IoT: -15≤ Q2 < -6 [dB] | Tdetect,EUTRAN_Inter_EC [s] (number of DRX or eDRX cycles Note 4) for neighboring cell with SCH Es/IoT: Q2≥-6 [dB] | $T_{measure,EUTRAN_Inter_EC}$ [s] (number of DRX or eDRX cycles Note 4) | $T_{evaluate,E\text{-}UTRAN_inter_EC}$ [s] (number of DRX or eDRX cycles Note 4) |
|---|---|---|---|---|---|---|
| 5.12 | N/A | N/A | 2078.72 (406) | 133.12 (26) | 5.12 (1) | 30.72 (6) |
| 10.24 ≤ eDRX_IDLE cycle lengt | 0.32 | ≥1.28 (1) | Note 3 (406) | Note 3 (26) | 0.32 (1) | Note 3 (6) |
| | 0.64 | ≥1.28 (1) | | | 0.64 (1) | Note 3 (6) |
| | 1.28 | ≥1.28 (1) | | | 1.28 (1) | Note 3 (6) |
| | 2.56 | ≥2.56 (2) | | | 2.56 (1) | Note 3 (6) |

NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.
NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].
NOTE 3: The detection period and the evaluation period depend on the number *N* of DRX cycles and are calculated according to the formula below:

$$eDRX_cycle_length \times \left\lceil \frac{N}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil .$$

NOTE 4: Number of eDRX cycles when eDRX_IDLE cycle length equals 5.12s, number of DRX cycles otherwise.

For higher priority cells, a UE may optionally use a shorter value for $T_{measure,EUTRAN_Inter_EC}$, which shall not be less than Max(0.64 s, one DRX cycle).

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

If all the relaxed monitoring criteria defined in clause 5.2.4.12 of TS 36.304 [1] are fulfilled then the UE's inter-frequency measurement is not required to meet $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_EC}$ as defined in Table 4.7.2.2.3-1 and Table 4.7.2.2.3-3.

### 4.7.2.2.4 Maximum allowed layers for multiple monitoring for UE category M1 in enhanced coverage

The UE category M1 in enhanced coverage shall be capable of monitoring at least:

- Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 2 TDD E-UTRA inter-frequency carriers.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 5 carrier frequency layers, which include one serving carrier frequency and any of the above defined combination of E-UTRA FDD inter-frequency and E-UTRA TDD inter-frequency layers.

### 4.7.2.2.5 Maximum interruption in paging reception for Category M1 UEs in enhanced coverage

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception. When the UE is configured with eDRX_IDLE cycle, the UE shall not miss any paging in a PTW provided the paging is sent in at least 2 DRX cycles before the end of that PTW.

At intra-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency cell for paging reception. The interruption time shall not exceed $T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ + 50 ms.

$T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ is the time required for receiving all the relevant system information data, which include MIB and relavant SIB, according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for an E-UTRAN cell.

These requirements assume extended coverage radio conditions and do not take into account cell re-selection failure.

For any requirement in this section, when the UE transitions between any two states when being configured with eDRX_IDLE, being configured with eDRX_IDLE cycle, changing eDRX_IDLE cycle length, or changing PTW configuration, the UE shall meet the transition requirement, which is the less stringent requirement of the two requirements corresponding to the first state and the second state, during the transition time interval which is the time corresponding to the transition requirement. After the transition time interval, the UE has to meet the requirement corresponding to the second state.

### 4.7.2.3 WUS receptions for UE category M1

This clause contains requirements on the UE regarding WUS reception provided that WUS has been configured in the serving cell and the UE is configured to receive up to 2 WUS sequences within the same resource.

The UE shall be capable of receiving the WUS signals of the serving cell provided that the minimum number of repetitions configured in the serving cell is according to Table 4.7.2.3-1 for normal coverage and Table 4.7.2.3-2 for enhanced coverage and the higher layer parameter *wus-PowerBoost* as indicated in SIB is configured to be 0 dB.

**Table 4.7.2.3-1: Conditions for WUS reception for UE normal coverage level**

| DRX cycle length [s] | Required number of repetition of WUS signal with 1 transmit antenna | Required number of repetition of WUS signal with 2 transmit antennas |
|---|---|---|
| ≤ 1.28 | 32 | 4 |
| > 1.28 | 64 | 4 |

**Table 4.7.2.3-2: Conditions for WUS reception for UE enhanced coverage level**

| DRX cycle length [s] | Required number of repetition of WUS signal with 1 transmit antenna | Required number of repetition of WUS signal with 2 transmit antennas |
|---|---|---|
| ≤ 1.28 | 128 | 32 |
| > 1.28 | 256 | 64 |

## 4.7.3 Channel quality report for UE Category M1 in idle mode

The requirements in this clause shall apply for UE supporting DL channel quality reporting for UE Category M1 as defined in TS 36.321 [17] section 5.25.

The DL channel quality provides the serving eNB with information about

- the minimum MPDCCH repetition level to satisfy the hypothetical MPDCCH block error rate of 1% with the parameters specified in Table 4.7.3-1 if the repetition level in DL quality report is larger than 1, or

- the minimum MPDCCH aggregation level to satisfy the hypothetical MPDCCH block error rate of 1% with the parameters specified in Table 4.7.3-2 if the repetition level in DL quality report is 1 and UE is in normal coverage.

**Table 4.7.3-1: MPDCCH transmission parameters for downlink quality reporting, repetition number being reported**

| Attribute | Normal coverage | Enhanced coverage |
|---|---|---|
| DCI format | 6-1A | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz | |
| MPDCCH Aggregation level (ECCE) Note2 | 24 | |
| M-PDCCH Transmission type | Distributed | |

**Table 4.7.3-2: MPDCCH transmission parameters for downlink quality reporting, aggregation level being reported**

| Attribute | Normal coverage |
|---|---|
| DCI format | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| MPDCCH repetition level Note1 | 1 |
| M-PDCCH Transmission type | Distributed |

When UE is in idle mode, the reported MPDCCH repetition level or aggregation level shall be derived from the channel quality measured in the period T in the narrowband where the random access response is transmitted, where

- T is the period from the beginning of the random access response to the beginning of PUSCH for DL channel quality reporting.

The MPDCCH repetition level or aggregation level is chosen from the supported MPDCCH repetition levels and aggregation levels [3]. The report mapping is defined in section 9.1.21.22.

The UE shall satisfy the downlink channel quality measurement accuracy requirements as specified in section 9.1.21.23 if UE is in normal coverage or in section 9.1.21.24 if UE is in enhanced coverage.

## 4.7.4 Requirements for transmission using preconfigured uplink resources for UE category M1

### 4.7.4.1 Introduction

The requirements in this clause are applicable when the UE is configured with timing alignment (TA) validation using *pur-RSRP-ChangeThreshold* for transmitting in uplink using preconfigured uplink resources (PUR) as specified in [TS 36.331].

### 4.7.4.2 Requirements on UE synchronization for transmission using PUR

The requirements in this clause are applicable for the UE in normal coverage or in enhanced coverage.

The UE is allowed to transmit using the preconfigured uplink resources provided that the UE is synchronized towards the serving cell prior to transmission. If the UE is not able to obtain the synchronization towards the serving cell then the UE shall drop the PUR transmission. The UE determines the PUR transmission occasion according to the received PUR configuration [TS 36.331].

### 4.7.4.3 Requirements on TA validation for transmission using PUR

When *rsrp-ChangeThresh* [TS 36.331] is configured for TA validation based on the RSRP change criterion according to clause 5.3.3.19 in [TS 36.331], with or without other TA validation criteria, the UE is allowed to transmit using PUR using the timing derived using the latest available $N_{\mathrm{TA}}$ value as specified in subclause 7.24.1 provided that

- the first RSRP ($RSRP_1$) measurement and the second RSRP ($RSRP_2$) measurements used in the TA validation are valid measurements and,

- timing alignment validation for transmission using PUR is valid according to the validation criteria in section 5.3.3. 19 in [TS 36.331] for all configured TA validation criteria.

$RSRP_1$ is considered valid provided that the following condition is met when in normal coverage:

$$(T1 - \min(480\ ms, N \times DRX\ cycle)) \leq T1' \leq (T1 + \min(480\ ms, N \times DRX\ cycle))$$

$RSRP_1$ is considered valid provided that the following condition is met when in enhanced coverage:

$$(T1 - \min(800\ ms, N \times DRX\ cycle)) \leq T1' \leq (T1 + \min(800\ ms, N \times DRX\ cycle))$$

$RSRP_2$ is considered valid provided that the following condition is met when in normal coverage:

$$T2 - min(480\ ms, N \times DRX\ cycle) \leq T2' \leq T2$$

$RSRP_2$ is considered valid provided that the following condition is met when in enhanced coverage:

$$T2 - min(800\ ms, N \times DRX\ cycle) \leq T2' \leq T2$$

If at least one of $RSRP_1$ and $RSRP_2$ is considered to be invalid based on the above conditions then the UE shall not validate the PUR using $RSRP_1$ and $RSRP_2$ and shall not transmit using PUR.

Where

- T1 is the time when the latest $N_{TA}$was obtained by the UE via Timing Advance Command MAC control element or PDCCH for transmission on PUR,
- T1' is the time when the UE has completed $RSRP_1$,
- T2 is the time when the UE performs TA validation defined in clause 5.3.3.19 in [TS 36.331] for transmission using PUR,
- T2' is the time when the UE has completed $RSRP_2$.
- N is applicable only if relaxed serving cell monitoring as defined in clause 4.7.2.1.1A for normal coverage or 4.7.2.2.1A for enhanced coverage is in use. Otherwise, N=1.
- For normal coverage, N is the relaxation factor and is given by Table 4.7.2.1.1A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.7.2.1.1A-2 if the UE is configured with eDRX_IDLE cycle if relaxed serving cell monitoring as defined in clause 4.7.2.1.1A is in use.
- For enhanced coverage, N is the relaxation factor and is given by Table 4.7.2.2.1A-1 if the UE is not configured with eDRX_IDLE cycle and by Table 4.7.2.2.1A-2 if the UE is configured with eDRX_IDLE cycle if relaxed serving cell monitoring as defined in clause 4.7.2.2.1A is in use.

# 4.8 Idle State Positioning Measurement Requirements for UE category NB1

## 4.8.1 OTDOA Intra-Frequency RSTD Measurements for UE category NB1 for normal coverage

The UE shall follow the procedure for RRC_IDLE state positioning measurements as defined in TS 36.305 [36] clause 7.1.3.

When the physical layer cell identities of the neighbour cells together with the OTDOA assistance data have been provided and the UE has entered the RRC_IDLE state, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$ = 16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreq,NB}$ ms as given below:

$$T_{RSTD\ IntraFreq,NB} = T_{NPRS} \cdot (M-1) + \Delta \quad ms,$$

where

$T_{RSTDIntraFreq,NB}$ is the total time for detecting and measuring at least $n$ cells;

$T_{NPRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] if Part B subframe configuration is provided; otherwise if only Part A subframe configuration is provided, the $T_{NPRS}$ equals to the length of the subframe pattern,

$M$ is the number of NPRS positioning occasions as defined in Table 4.8.1-1,

$\Delta = T_{\mathrm{NPRS}} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single NPRS positioning occasion which includes the sampling time and the processing time;

$N_{\mathrm{NPRS}}$ is the cell-specific number of NPRS subframes within a NPRS occasion as defined in TS36.355[24] if Part B subframe configuration is provided; if only Part A subframe configuration is provided, the NPRS occasion length is 10 ms,

$N_{NPRS_total}$ is the minimum number of NPRS subframes per cell measurement as specified in Section 9.1.22.10.

$T_{\mathrm{NPRS}}$ $N_{\mathrm{NPRS}}$, and $N_{NPRS_total}$ are the parameters of the same cell, for which $T_{NPRS} \cdot \left\lceil \frac{N_{NPRS_total}}{N_{NPRS}} \right\rceil$ is the largest among all the measured cells.

**Table 4.8.1-1: Number of NPRS positioning occasions within $T_{\mathrm{RSTDIntraFreq,NB}}$**

| Positioning subframe configuration period $T_{\mathrm{NPRS}}$ | Number of NPRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ | $32 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ |
| >160 ms | $8 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ | $16 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{\mathrm{RSTDIntraFreq,NB}}$ provided:

$\left(\mathrm{NPRS}\ \hat{E}_s / \mathrm{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\mathrm{NPRS}\hat{E}_s / \mathrm{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\mathrm{NPRS}\ \hat{E}_s / \mathrm{Iot}\right)_{ref}$ and $\left(\mathrm{NPRS}\hat{E}_s / \mathrm{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ NPRS positioning occasions,

NPRP $1,2|_{\mathrm{dBm}}$ according to Annex B.2.16 for a corresponding Band

$\mathrm{NPRS}\hat{E}_s / \mathrm{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry NPRS.

The time $T_{\mathrm{RSTDIntraFreq,NB}}$ starts from the point when the UE has received both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the message and data have been delivered to the physical layer of the UE and the UE has entered the RRC_IDLE state.

The RSTD measurement accuracy for all measured neighbor cells *i* shall fulfill the requirements specified in sub-clause 9.1.22.10.

#### 4.8.1.1 RSTD Measurement Reporting Delay

The reported measurements contained in the event triggered measurement reports shall meet the requirements in clause 9.1.22.10.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

After receiving both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], the UE shall be sent to RRC IDLE state. The measurement reporting delay is defined as the time between the point when the UE has entered the RRC_IDLE state, and the point when the UE is ready to transmit the measurement report over the air interface and starts to establish a signalling connection with the MME. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, otherwise the uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes the delay caused by not having UL resources for the UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the RRC_IDLE mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in TS 36.305 [36] for LPP measurement reporting.

The measurement reporting delay shall be less than $T_{RSTDIntraFreq,NB}$ defined in Clause 4.8.1.

### 4.8.2 OTDOA Intra-Frequency RSTD Measurements for UE category NB1 for enhanced coverage

The UE shall follow the procedure for RRC_IDLE state positioning measurements as defined in TS 36.305 [36] clause 7.1.3.

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data have been provided and the UE has entered the RRC_IDLE state, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$ = 16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreq,NB}$ ms as given below:

$$T_{RSTD\ IntraFreq,NB} = T_{NPRS} \cdot (M-1) + \Delta \quad ms,$$

where

$T_{RSTDIntraFreq,NB}$ is the total time for detecting and measuring at least $n$ cells;

$T_{NPRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] if Part B subframe configuration is provided; otherwise if only Part A subframe configuration is provided, the $T_{NPRS}$ equals to the length of the subframe pattern,

$M$ is the number of NPRS positioning occasions as defined in Table 4.8.2-1,

$\Delta = T_{NPRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single NPRS positioning occasion which includes the sampling time and the processing time;

$N_{NPRS}$ is the cell-specific number of NPRS subframes within a NPRS occasion as defined in TS 36.355[24] if Part B subframe configuration is provided; if only Part A subframe configuration is provided, the NPRS occasion length is 10 ms,

$N_{NPRS_total}$ is the minimum number of NPRS subframes per cell measurement as specified in Section 9.1.22.12.

$T_{\text{NPRS}}$ $N_{\text{NPRS}}$, and $N_{NPRS_total}$ are the parameters of the same cell, for which $T_{NPRS} \cdot \left\lceil \frac{N_{NPRS_total}}{N_{NPRS}} \right\rceil$ is the largest among all the measured cells.

**Table 4.8.2-1: Number of NPRS positioning occasions within $T_{\text{RSTDIntraFreq,NB}}$**

| Positioning subframe configuration period $T_{\text{NPRS}}$ | Number of NPRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ | $32 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ |
| >160 ms | $8 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ | $16 * \lvert N_{NPRS_total} / N_{NPRS} \rvert$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{\text{RSTDIntraFreq,NB}}$ provided:

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ NPRS positioning occasions,

NPRP $1,2|_{\text{dBm}}$ according to Annex B.2.16 for a corresponding Band

$\text{NPRS}\hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry NPRS.

The time $T_{\text{RSTDIntraFreq,NB}}$ starts from the point when the UE has received both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the message and the data have been delivered to the physical layer of the UE, and the UE has entered the RRC_IDLE state.

The RSTD measurement accuracy for all measured neighbor cells *i* shall fulfill the requirements specified in sub-clause 9.1.22.12.

### 4.8.2.1 RSTD Measurement Reporting Delay

The reported measurements contained in the event triggered measurement reports shall meet the requirements in clause 9.1.22.12.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

After receiving both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], the UE shall be sent to RRC IDLE state. The measurement reporting delay is defined as the time between the point when the UE has entered the RRC_IDLE state,

and the point when the UE is ready to transmit the measurement report over the air interface and starts to establish a signalling connection with the MME. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, otherwise the uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes the delay caused by not having UL resources for the UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the RRC_IDLE mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in TS 36.305 [36] for LPP measurement reporting.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqNB}$ defined in Clause 4.8.2.

### 4.8.3 OTDOA Inter-Frequency RSTD Measurements for UE category NB1 for normal coverage

The UE shall support NPRS configuration in more than one resource block [24]. The UE shall follow the procedure for RRC_IDLE state positioning measurement as defined in TS 36.305 [36] clause 7.1.3.

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.22.11 are available for RSTD measurements in the measured and reference cell.

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data have been provided and the UE has entered the RRC_IDLE state, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$ = 16 cells, including the reference cell within $T_{RSTD\ InterFreq,\ NB}$ ms as given below:

$$T_{RSTD\ InterFreq,NB} = T_{NPRS} \cdot (M-1) + \Delta \quad ms,$$

where

$T_{RSTD\ InterFreq,\ NB}$ is the total time for detecting and measuring at least $n$ cells;

$T_{NPRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] if Part B subframe configuration is provided; otherwise if only Part A subframe configuration is provided, the $T_{NPRS}$ equals to the length of the subframe pattern,

$M$ is the number of NPRS positioning occasions as defined in Table 4.8.1-1,

$\Delta = T_{NPRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single NPRS positioning occasion which includes the sampling time and the processing time;

$N_{NPRS}$ is the cell-specific number of NPRS subframes within a NPRS occasion as defined in TS36.355 [24] if Part B subframe configuration is provided; if only Part A subframe configuration is provided, the NPRS occasion length is 10 ms,

$N_{NPRS_total}$ is the minimum number of NPRS subframes per cell measurement as specified in Section 9.1.22.11.

$T_{NPRS}$ $N_{NPRS}$, and $N_{NPRS_total}$ are the parameters of the same cell, for which $T_{NPRS} \cdot \left\lceil \frac{N_{NPRS_total}}{N_{NPRS}} \right\rceil$ is the largest among all the measured cells.

**Table 4.8.1-1: Number of NPRS positioning occasions within $T_{\text{RSTD InterFreq, NB}}$**

| Positioning subframe configuration period $T_{\text{NPRS}}$ | Number of NPRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ | $32 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ |
| >160 ms | $8 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ | $16 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{\text{RSTD InterFreq, NB}}$ provided:

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ NPRS positioning occasions,

NPRP $1,2|_{\text{dBm}}$ according to Annex B.2.17 for a corresponding Band

$\text{NPRS}\hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry NPRS.

The time $T_{\text{RSTD InterFreq, NB}}$ starts from the point when the UE has received both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the message and data have been delivered to the physical layer of the UE and the UE has entered the RRC_IDLE state.

The RSTD measurement accuracy for all measured neighbor cells *i* shall fulfill the requirements specified in sub-clause 9.1.22.11.

### 4.8.3.1 RSTD Measurement Reporting Delay

The reported measurement contained in the event triggered measurement reports shall meet the requirements in clause 9.1.22.11.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

After receiving both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], the UE shall be sent to RRC IDLE state. The measurement reporting delay is defined as the time between the point when the UE has entered the RRC_IDLE state, and the point when the UE is ready to transmit the measurement report over the air interface and starts to establish a signalling connection with the MME. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is $N_{rep}$x $\text{TTI}_{\text{DCCH}}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, otherwise the uncertainty is defined as 2 x $\text{TTI}_{\text{DCCH}}$. This measurement reporting delay excludes the delay caused by not having UL resources for the UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the RRC_IDLE mode measurement. This measurement reporting delay excludes any delay caused by establishing a

signalling connection with the MME (including random access procedure) as defined in TS 36.305 [36] for LPP measurement reporting.

The measurement reporting delay shall be less than $T_{\text{RSTD InterFreq, NB}}$ defined in Clause 4.8.3.

## 4.8.4 OTDOA Inter-Frequency RSTD Measurements for UE category NB1 for enhanced coverage

The UE shall support NPRS configuration in more than one resource block [24]. The UE shall follow the procedure for RRC_IDLE state positioning measurement as defined in TS 36.305 [36] clause 7.1.3.

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.22.13 are available for RSTD measurements in the measured and reference cell.

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data have been provided and the UE has entered the RRC_IDLE state, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$ = 16 cells, including the reference cell within $T_{\text{RSTD InterFreq, NB}}$ ms as given below:

$$T_{\text{RSTD InterFreq,NB}} = T_{\text{NPRS}} \cdot (M\text{-}1) + \Delta \quad ms,$$

where

$T_{\text{RSTD InterFreq, NB}}$ is the total time for detecting and measuring at least $n$ cells;

$T_{\text{NPRS}}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] if Part B subframe configuration is provided; otherwise if only Part A subframe configuration is provided, the $T_{\text{NPRS}}$ equals to the length of the subframe pattern,

$M$ is the number of NPRS positioning occasions as defined in Table 4.8.1-1,

$\Delta = T_{\text{NPRS}} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single NPRS positioning occasion which includes the sampling time and the processing time;

$N_{\text{NPRS}}$ is the cell-specific number of NPRS subframes within a NPRS occasion as defined in TS36.355[24] if Part B subframe configuration is provided; if only Part A subframe configuration is provided, the NPRS occasion length is 10 ms,

$N_{NPRS_total}$ is the minimum number of NPRS subframes per cell measurement as specified in Section 9.1.22.13.

$T_{\text{NPRS}}$ $N_{\text{NPRS}}$, and $N_{NPRS_total}$ are the parameters of the same cell, for which $T_{NPRS} \cdot \left\lceil \frac{N_{NPRS_total}}{N_{NPRS}} \right\rceil$ is the largest among all the measured cells.

**Table 4.8.1-1: Number of NPRS positioning occasions within $T_{\text{RSTD InterFreq, NB}}$**

| Positioning subframe configuration period $T_{\text{NPRS}}$ | Number of NPRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ | $32 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ |
| >160 ms | $8 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ | $16 * \lvert N_{total_NPRS} / N_{NPRS} \rvert$ |

| | |
|---|---|
| Note 1: | When only intra-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1. |
| Note 2: | When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{\text{RSTD InterFreq, NB}}$ provided:

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{NPRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{NPRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ NPRS positioning occasions,

NPRP $1,2|_{\text{dBm}}$ according to Annex B.2.17 for a corresponding Band

$\text{NPRS}\hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry NPRS.

The time $T_{\text{RSTDIntraFreq,NB}}$ starts from the point when the UE has received both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the message and data have been delivered to the physical layer of the UE and the UE has entered the RRC_IDLE state.

The RSTD measurement accuracy for all measured neighbor cells *i* shall fulfill the requirements specified in sub-clause 9.1.22.13.

### 4.8.4.1 RSTD Measurement Reporting Delay

The reported measurements contained in the event triggered measurement reports shall meet the requirements in clause 9.1.22.13.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

After receiving both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], the UE shall be sent to RRC IDLE state. The measurement reporting delay is defined as the time between the point when the UE has entered the RRC_IDLE state, and the point when the UE is ready to transmit the measurement report over the air interface and starts to establish a signalling connection with the MME. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is $N_{rep}$x $\text{TTI}_{\text{DCCH}}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, otherwise uncertainty is defined as 2 x $\text{TTI}_{\text{DCCH.}}$ This measurement reporting delay excludes the delay caused by not having UL resources for the UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the RRC_IDLE mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in TS 36.305 [36] for LPP measurement reporting.

The measurement reporting delay shall be less than $T_{\text{RSTD InterFreq, NB}}$ defined in Clause 4.8.4.

## 4.8.5 Intra-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for normal coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable intra frequency cell within $T_{identify_intra_NC_ECID}$ provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID intra-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX_IDLE cycle, $T_{identify_intra_NC_ECID}$ is as shown in Table 4.8.5-1. For UE configured with eDRX_IDLE cycle, $T_{identify_intra_NC_ECID}$ is as shown in Table 4.8.5-2.

**Table 4.8.5-1: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement**

| DRX cycle length [s] | $T_{detect,NB_Intra_NC_ECID}$ [s] (number of DRX cycles) | $T_{measure_Intra_NC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|
| 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

**Table 4.8.5-2: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Intra_NC_ECID}$ [s] (number of DRX cycles) | $T_{measure_Intra_NC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{20}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) |
| | 0.64 | ≥12.8 (5) | | 1.28 (2) |
| | 1.28 | ≥15.36 (6) | | 1.28 (1) |
| | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | |

An intra frequency cell is considered to be detectable when the conditions for NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.4 are met for a corresponding Band.

For UE not configured with eDRX_IDLE cycle, the measurement period for intra frequency measurements is $T_{measure_intra_NC_ECID}$ as shown in Table 4.8.5-1. For UE configured with eDRX_IDLE cycle, the measurement period for intra frequency measurements is $T_{measure_intra_NC_ECID}$ as shown in Table 4.8.5-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for [1] identified intra-frequency cell, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_NC_ECID}$.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.1. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.3.

### 4.8.5.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.1 and 9.1.22.3.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled. The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

## 4.8.6 Intra-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for enhanced coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable intra frequency cell within $T_{identify_intra_EC_ECID}$ provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID intra-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX_IDLE cycle, $T_{identify_intra_EC_ECID}$ is as shown in Table 4.8.6-1. For UE configured with eDRX_IDLE cycle, $T_{identify_intra_EC_ECID}$ is as shown in Table 4.8.6-2.

**Table 4.8.6-1: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement**

| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | $T_{detect,NB_Intra_EC_ECID}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_EC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0.32 | 256 (800) | 1.28 (4) |
| | 0.64 | 266 (415) | 1.28 (2) |
| | 1.28 | 532 (415) | 1.28 (1) |
| | 2.56 | 532 (208) | 2.56 (1) |
| | 5.12 | 1063 (208) | 5.12 (1) |
| | 10.24 | 1063 (104) | 10.24 (1) |
| Q2≥-6 | 0.32 | 26 (80) | 1.28 (4) |
| | 0.64 | 29 (45) | 1.28 (2) |
| | 1.28 | 58 (45) | 1.28 (1) |
| | 2.56 | 59 (23) | 2.56 (1) |
| | 5.12 | 113 (22) | 5.12 (1) |
| | 10.24 | 113 (11) | 10.24 (1) |

**Table 4.8.6-2: Requirement to identify a newly detectable intra-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX_IDLE cycle**

| SCH Ês/Iot of neighboring cell: Q2 | eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Intra_EC_ECID}$ [s] (number of DRX cycles) | $T_{measure,NB_Intra_EC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| -15≤ Q2 < -6 | 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{[406]}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (406) | 1.28 (4) |
| | | 0.64 | ≥12.8 (5) | | 1.28 (2) |
| | | 1.28 | ≥15.36 (6) | | 1.28 (1) |

| | | | | | |
|---|---|---|---|---|---|
| | | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| Q2≥-6 | 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{20}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) |
| | | 0.64 | ≥12.8 (5) | | 1.28 (2) |
| | | 1.28 | ≥15.36 (6) | | 1.28 (1) |
| | | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

An intra frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.4 for a corresponding Band.

For UE not configured with eDRX_IDLE cycle, the measurement period for intra frequency measurements is $T_{measure_intra_EC_ECID}$ as shown in Table 4.8.6-1. For UE configured with eDRX_IDLE cycle, the measurement period for intra frequency measurements is $T_{measure_intra_EC_ECID}$ as shown in Table 4.8.6-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified intra-frequency cell, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_EC_ECID}$.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.1. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.3.

### 4.8.6.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.1 and 9.1.22.3.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

## 4.8.7 Inter-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for normal coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable inter frequency cell according to the following expression provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state:

$$T_{identify_inter_NC_ECID} = N_{freq_NB_ECID} \cdot T_{identify_inter_NC_perCC_ECID}$$

Where $N_{freq_NB_ECID}$ is the total number of inter frequency carriers UE measures provided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.

For UE not configured with eDRX_IDLE cycle, $T_{identify_inter_NC_perCC_ECID}$ is as shown in Table 4.8.7-1. For UE configured with eDRX_IDLE cycle, $T_{identify_inter_NC_perCC_ECID}$ is as shown in Table 4.8.7-2.

**Table 4.8.7-1: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement**

| DRX cycle length [s] | $T_{detect,NB_Inter_NC_perCC_ECID}$ [s] (number of DRX cycles) | $T_{measure_Inter_NC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|
| 0.32 | 26 (80) | 1.28 (4) |
| 0.64 | 29 (45) | 1.28 (2) |
| 1.28 | 58 (45) | 1.28 (1) |
| 2.56 | 59 (23) | 2.56 (1) |
| 5.12 | 113 (22) | 5.12 (1) |
| 10.24 | 113 (11) | 10.24 (1) |

**Table 4.8.7-2: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Inter_NC_ECID}$ [s] (number of DRX cycles) | $T_{measure_Inter_NC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{20}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) |
| | 0.64 | ≥12.8 (5) | | 1.28 (2) |
| | 1.28 | ≥15.36 (6) | | 1.28 (1) |
| | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | |

An inter frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

For UE not configured with eDRX_IDLE cycle,the measurement period for inter frequency measurements is $T_{measure_inter_NC_ECID}$ as shown in Table 4.8.7-1. For UE configured with eDRX_IDLE cycle,the measurement period for inter frequency measurements is $T_{measure_inter_NC_ECID}$ as shown in Table 4.8.7-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified inter-frequency cell per inter-frequency for at least 1 inter-frequency carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_inter_NC_ECID}$.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.5. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.7.

### 4.8.7.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.5 and 9.1.22.7.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

## 4.8.8 Inter-Frequency E-CID NRSRP and NRSRQ Measurements for UE category NB2 for enhanced coverage

UE shall follow the procedure for idle state positioning measurement as defined in [36] section 7.1.3.

The UE shall be able to identify a new detectable inter frequency cell according to the following expression provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state:

$$T_{identify_inter_EC} = N_{freq_NB_ECID} \cdot T_{identify_inter_EC_perCC_ECID}$$

Where $N_{freq_NB_ECID}$ is the total number of inter frequency carriers UE measuresprovided that the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID inter-frequency NRSRP and NRSRQ measurements [24] and UE has entered the idle state.$Ti_{dentify_inter_EC_perCC_ECID}$ is shown in Table 4.8.8-1

For UE not configured with eDRX_IDLE cycle, $Ti_{dentify_inter_EC_perCC_ECID}$ is as shown in Table 4.8.8-1. For UE configured with eDRX_IDLE cycle, $Ti_{dentify_inter_EC_perCC_ECID}$ is as shown in Table 4.8.8-1.

**Table 4.8.8-1: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement**

| SCH Ês/Iot of neighboring cell: Q2 | DRX cycle length [s] | $T_{detect,NB_Inter_EC_perCC_ECID}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_EC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0.32 | 256 (800) | 1.28 (4) |
| | 0.64 | 266 (415) | 1.28 (2) |
| | 1.28 | 532 (415) | 1.28 (1) |
| | 2.56 | 532 (208) | 2.56 (1) |
| | 5.12 | 1063 (208) | 5.12 (1) |
| | 10.24 | 1063 (104) | 10.24 (1) |
| Q2≥-6 | 0.32 | 26 (80) | 1.28 (4) |
| | 0.64 | 29 (45) | 1.28 (2) |
| | 1.28 | 58 (45) | 1.28 (1) |
| | 2.56 | 59 (23) | 2.56 (1) |
| | 5.12 | 113 (22) | 5.12 (1) |
| | 10.24 | 113 (11) | 10.24 (1) |

**Table 4.8.8-2: Requirement to identify a newly detectable inter-frequency cell for E-CID NRSRP/NRSRQ measurement for UE configured with eDRX_IDLE cycle**

| SCH Ês/Iot of neighboring cell: Q2 | eDRX_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 2.56s periods) | $T_{detect,NB_Inter_EC_perCC_ECID}$ [s] (number of DRX cycles) | $T_{measure,NB_Inter_EC_ECID}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| **-15≤ Q2 < -6** | 20.48 ≤ eDRX_IDLE cycle | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{[406]}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (406) | 1.28 (4) |
| | | 0.64 | ≥12.8 (5) | | 1.28 (2) |

| | | | | | |
|---|---|---|---|---|---|
| | length ≤ 10485.76 | 1.28 | ≥15.36 (6) | | 1.28 (1) |
| | | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| **Q2≥-6** | 20.48 ≤ eDRX_IDLE cycle length ≤ 10485.76 | 0.32 | ≥12.8 (5) | $eDRX_cycle_length \times \left\lceil \frac{20}{\lceil PTW / DRX_cycle_length \rceil} \right\rceil$ (20) | 1.28 (4) |
| | | 0.64 | ≥12.8 (5) | | 1.28 (2) |
| | | 1.28 | ≥15.36 (6) | | 1.28 (1) |
| | | 2.56 | ≥17.92 (7) | | 2.56 (1) |
| | | 5.12 | ≥23.04 (9) | | 5.12 (1) |
| | | 10.24 | ≥33.28 (13) | | 10.24 (1) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.<br>NOTE 2: The eDRX_IDLE cycle lengths are as specified in Section X of TS 24.008 [34]. | | | | | |

An inter frequency cell is considered to be detectable according to NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot defined in Annex B.1.5 for a corresponding Band.

For UE not configured with eDRX_IDLE cycle, the measurement period for inter frequency measurements is $T_{measure_inter_EC_ECID}$ as shown in Table 4.8.8-1. For UE configured with eDRX_IDLE cycle, the measurement period for inter frequency measurements is $T_{measure_inter_EC_ECID}$ as shown in Table 4.8.8-2.

The UE shall be capable of performing NRSRP and NRSRQ measurement for at least 1 identified inter-frequency cell per inter-frequency for at least 1 inter-frequency carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_inter_EC_ECID}$.

The NRSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.22.5. The NRSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.22.7.

### 4.8.8.1 Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.22.5 and 9.1.22.7.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of NPUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. This measurement reporting delay excludes any delay caused by RRC connection release before the idle mode measurement. This measurement reporting delay excludes any delay caused by establishing a signalling connection with the MME (including random access procedure) as defined in [36] for LPP measurement reporting.

## 4.9 Idle Mode CA Measurement

### 4.9.1 Introduction

A UE supporting *ca-IdleModeMeasurements* shall perform the idle mode measurement on the inter-frequency CA candidate frequencies/cells indicated by higher layers and meet the requirement specified in this section. A UE supporting *nr-IdleInactiveMeasFR1-r16* and/or *nr-IdleInactiveMeasFR2-r16* shall perform the idle mode measurement on the NR inter-RAT EN-DC candidate frequencies/cells indicated by higher layers and meet the requirement specified in this section.

Additionally, a UE supporting *ca-IdleModeMeasurements* or *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall perform the idle mode measurement on serving cell and meet the requirement specified in this section.

A UE only supporting *ca-IdleModeMeasurements* shall fulfil the requirements defined for a UE supporting *ca-IdleModeMeasurements* as defined in this section.

A UE only supporting *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall fulfil the requirements defined for a UE supporting *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* as defined in this section.

A UE supporting both *ca-IdleModeMeasurements* and *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* shall fulfil the requirements for a UE supporting *ca-IdleModeMeasurements* and *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16* as defined in this section.

The requirements in clause 4.9 apply provided that the UE is provided with a valid timer T331 by dedicated RRC signaling and T331 is running.

## 4.9.2 Requirement

For a UE which supports *ca-IdleModeMeasurements* the UE shall support the idle mode CA measurements on the serving cell, overlapping and non-overlapping carriers.

For inter-frequency idle mode measurements, an overlapping carrier is defined as a carrier configured by higher layer for early measurement reporting and inter-frequency mobility measurements. A non-overlapping carrier is defined as a carrier configured by higher layer for early measurement reporting while not configured for inter-frequency mobility measurements.

### 4.9.2.1 Detected cell requirement during state transition and Idle mode

This subclause defines the requirements for the detected cell status for the idle mode CA measurement when UE transitions from RRC Connected mode to Idle mode and after UE has entered Idle mode. The requirements are applicable to an E-UTRAN carrier aggregation or EN-DC capable UE which has been configured with one or more downlink SCells or NR PSCell and one or more downlink NR SCells during the Connected mode and which supports *ca-IdleModeMeasurements* or *nr-IdleInactiveMeasFR1-r16*/*nr-IdleInactiveMeasFR2-r16*. The requirements are applicable for E-UTRAN FDD and TDD SCell(s), and NR PSCell and SCells.

Upon releasing the connection and if the UE has been configured with idle mode CA measurement reporting, following requirements apply concerning the detected cells in Connected mode upon state transitioning to Idle mode and during Idle mode:

- A cell which is detected cell in Connected mode prior to connection release, shall remain detected after UE has entered Idle mode and during Idle mode, provided that the following conditions are met:
  - The UE has been provided with a list of cells and/or carrier frequencies for early measurement reporting by dedicated RRC signaling and
  - The detected cell is among the list of cells or on a carrier frequency provided for early measurement reporting, and
  - The UE is provided with a valid timer T331 by dedicated RRC signaling, and
  - For inter-frequency carrier, the detected cell remains detectable until UE reconnects to the network and transmits the early measurement report, or for NR inter-RAT carrier, the detected cell and SSBs of the detected cell remains detectable until UE reconnects to the network and transmits the early measurement report.
  - The carrier frequency of the detected cell and the carrier frequency of the serving cell are among the supported band combination of the UE.

An inter-frequency cell is considered detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.1 and Annex B.1.2 for a corresponding Band. An inter-RAT NR cell is considered detectable according to the conditions in B.1.3 of [50] for a corresponding band. An SSB of an inter-RAT NR cell is considered detectable according to SSB_RP and SSB Ês/Iot defined in Annex B.1.3 of [50] for a corresponding Band.

In the absence or expiration of T331, it is up to UE implementation to apply the requirements on the detected cell status in this subclause.

### 4.9.2.2 Measurements of inter-frequency CA candidate cells

While T331 is running, the UE shall perform measurement on the configured overlapping and non-overlapping inter-frequency carriers for idle mode measurement reporting.

A UE which supports *ca-IdleModeMeasurements* shall support the idle mode CA measurements of at least 1 non-overlapping inter-frequency carrier and 1 overlapping inter-frequency carrier.

For overlapping carriers, the inter-frequency measurement requirements in section 4.2.2.4 apply.

For non-overlapping carriers, at least prior to transmission of the idle mode measurement report, the UE shall perform at least a single measurement on detected cells on the non-overlapping inter-frequency carrier(s) configured to be measured for early measurement reporting.

In the absence or expiration of T331, it is up to UE implementation to perform the idle mode CA measurement.

For overlapping carriers, the UE shall be capable of performing RSRP and RSRQ measurements of the overlapping carriers, and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the overlapping carriers to higher layers, with measurement accuracy as specified in sub-clauses 9.1.3B.2 and 9.1.6B.2, respectively. The UE shall be able to report idle mode CA measurements when idle mode CA measurement reporting is requested by the network.

### 4.9.2.3 Measurements on serving cell

The UE shall measure the RSRP and RSRQ level of the serving cell and evaluate the cell selection criterion S defined in section 4.2.2.1 and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements of the serving cell to higher layers, with measurement accuracy as specified in sub-clauses 9.1.2B.2 and 9.1.5B.2, respectively.

### 4.9.2.4 Measurements of inter-RAT NR DC candidate cells

While T331 is running, the UE shall perform measurement on the configured NR inter-RAT carriers for idle mode measurement reporting.

In addition to the requirements defined in section 4.2.2.9 and 4.2.2.9a, a UE which supports *nr-IdleInactiveMeasFR1-r16 or nr-IdleInactiveMeasFR2-r16* shall be able to support idle mode DC measurements of.

- at least 8 inter-RAT NR carriers which are also configured for inter-RAT mobility measurements, and
- at least 2 inter-RAT NR carrier which are not configured for inter-RAT mobility measurements.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 8 inter-RAT NR carriers for idle mode DC measurements comprising of carriers configured for inter-RAT mobility measurements and carriers not configured for inter-RAT mobility measurements.

For idle mode DC measurements on NR inter-RAT carriers, if Srxlev $\leq S_{nonIntraSearchP}$ and Squal $\leq S_{nonIntraSearchQ}$, the NR inter-RAT measurement requirements defined in clause 4.2.2.5.6 shall apply, where UE shall search for and measure inter-RAT layers configured for idle mode DC measurements in preparation for possible reporting. If Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for NR inter-RAT layers configured for idle mode DC measurements at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2, where UE shall search for and measure NR inter-RAT layers configured for idle mode DC measurements in preparation for possible reporting.

For UE supporting *nr-IdleInactiveBeamMeasFR1-r16* and/or *nr-IdleInactiveBeamMeasFR2-r16*, if the UE is configured with *beamMeasConfigIdle-r16* on one or more carriers for idle mode DC measurement, the UE, on each carrier, shall be able to

- detect a newly detectable inter-RAT NR cell and perform RSRP/RSRQ measurement in preparation for reporting, and
- detect and acquire the SSB index for a newly detectable inter-RAT NR cell if *beamMeasConfigIdle-r16* is configured on this carrier and perform RSRP/RSRQ measurement in preparation for reporting,

within the requirements defined in clause 4.2.2.5.6 plus $k*T_{SSB_index,NR}$, where k is the number of carriers configured for idle mode DC measurement with *beamMeasConfigIdle-r16*, and $T_{SSB_index,NR}$ is the additional time period used to acquire the index of the SSB being measured as defined in Table 4.9.2.4-1.

**Table 4.9.2.4-1: $T_{SSB_index,NR}$**

| DRX cycle length [s] | Scaling Factor (N1) | | $T_{SSB_index,NR}$ [s] (number of DRX cycles) |
|---|---|---|---|
| | FR1 | FR2[Note1] | |
| 0.32 | 1 | 8 | N2 x 1.28 x 1.5 x N1 (N2 x 4 x 1.5 x N1) |
| 0.64 | | 5 | N2 x 1.28 x N1 (N2 x 2 x N1) |
| 1.28 | | 4 | N2 x 1.28 x N1 (N2 x 1 x N1) |
| 2.56 | | 3 | N2 x 2.56 x N1 (N2 x 1 x N1) |
| NOTE 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.<br>NOTE 2: N2 = 3 if the NR inter-RAT carrier for idle mode DC measurement reporting is in FR1, and N2= 5 if the NR inter-RAT carrier for idle mode DC measurement reporting is in FR2. | | | |

For UE supporting *nr-IdleInactiveBeamMeasFR1-r16* and/or *nr-IdleInactiveBeamMeasFR2-r16*, if the UE is configured with *beamMeasConfigIdle-r16* for idle mode DC measurement, the UE shall be capable of performing SS-RSRP, SS-RSRQ for at least

- 7 SSBs with different SSB index and/or PCI on an NR inter- RAT layer in FR1,
- 10 SSBs with different SSB index and/or PCI on an NR inter- RAT layer in FR2.

In the absence or expiration of T331, it is up to UE implementation to perform the idle mode DC measurement.

The UE shall be capable of performing SS-RSRP and SS-RSRQ measurements of the carriers for idle mode DC measurements, and the UE physical layer shall be capable of reporting SS-RSRP and SS-RSRQ measurements of the carriers for idle mode DC measurements to higher layers, with measurement accuracy as specified in sub-clauses 9.11.1A and 9.11.2A, respectively. The UE shall be able to report idle mode DC measurements when idle mode DC measurement reporting is requested by the network.

# 4A E-UTRAN RRC_INACTIVE state mobility

## 4A.1 Cell Re-selection

*Editor's note: the E-UTRAN RRC_INACTIVE state mobility defined in section 4A.1 applies under the scope of LTE connectivity to NGCN.*

### 4A.1.1 Introduction

The E-UTRAN RRC_INACTIVE state requirements defined in this section applies for the UE when connected to NGCN with the conditions that,

- the UE is not configured with eDRX
- the UE is not configured with *highSpeedEnhancedMeasFlag*

### 4A.1.2 Requirements

#### 4A.1.2.1 UE measurement capability

The capability defined in section 4.2.2.9 should apply for this section.

#### 4A.1.2.2 Measurement and evaluation of serving cell

The requirements defined in section 4.2.2.1 should apply.

#### 4A.1.2.3 Measurements of intra-frequency E-UTRAN cells

The requirements defined in section 4.2.2.3 should apply.

#### 4A.1.2.4 Measurements of inter-frequency E-UTRAN cells

The requirements defined in section 4.2.2.4 should apply.

#### 4A.1.2.5 Evaluation of cell re-selection criteria

The requirements defined in section 4.2.2.6 should apply.

#### 4A.1.2.6 Maximum interruption in paging reception

The requirements defined in section 4.2.2.7 should apply.

#### 4A.1.2.7 Measurements of inter-RAT NR cells

The requirements defined in section 4.2.2.5.6 should apply.

## 4A.2 Requirements for UE Category M1

### 4A.2.1 Introduction

The E-UTRAN RRC_INACTIVE state requirements defined in this section applies for the Category M1 UE when connected to NGCN.

### 4A.2.2 Cell Selection

The requirements defined in section 4.7.1 shall apply.

### 4A.2.3 Cell Reselection

#### 4A.2.3.1 Cell Re-selection requirements for UE category M1 in normal coverage

##### 4A.2.3.1.1 Measurement and evaluation of serving cell for UE category M1 in normal coverage

The requirements defined in section 4.7.2.1.1 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.1.1 shall apply with $N_{serv_NC}$ defined in Table 4A.2.3.1.1-1.

**Table 4A.2.3.1.1-1: $N_{serv_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $N_{serv}$ [number of DRX cycles] |
|---|---|---|
| 5.12 ≤eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | 4 |
| | 0.64 | 4 |
| | 1.28 | 2 |
| | 2.56 | 2 |
| | 5.12 | 2 |
| | 10.24 Note 1 | 2 |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | |

#### 4A.2.3.1.2 Measurements of intra-frequency cells for UE category M1 in normal coverage

The requirements defined in section 4.7.2.1.2 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.1.2 shall apply with $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,E\text{-}UTRAN_Intra_NC}$ defined in Table 4A.2.3.1.2-1.

**Table 4A.2.3.1.2-1: $T_{detect,EUTRAN_Intra_NC}$, $T_{measure,EUTRAN_Intra_NC}$ and $T_{evaluate,E\text{-}UTRAN_Intra_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $T_{detect,EUTRAN_Intra_NC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_NC_RSS}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| 5.12 ≤eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) | 3.84 (12) |
| | 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) | 3.84 (6) |
| | 1.28 | 32(25) | 1.28 (1) | 6.4 (5) | 3.84 (3) |
| | 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | 3.84 (3) |
| | 5.12 | 117.76 (23) | 5.12 (1) | 15.36 (3) | 15.36 (3) |
| | 10.24 Note 1 | 235.52 (23) | 10.24 (1) | 30.72 (3) | 30.72 (3) |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | | | | |

#### A.2.3.1.3 Measurements of inter-frequency cells for UE category M1 in normal coverage

The requirements defined in section 4.7.2.1.3 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.1.3 shall apply with $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_NC}$ defined in Table 4A.2.3.1.3-1.

**Table 4A.2.3.1.3-1: $T_{detect,EUTRAN_Inter_NC}$, $T_{measure,EUTRAN_Inter_NC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_NC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $T_{detect,EUTRAN_Inter_NC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Inter_NC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_Inter_NC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|
| 5.12 ≤eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) |
| | 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) |
| | 1.28 | 32(25) | 1.28 (1) | 6.4 (5) |
| | 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| | 5.12 | 117.76 (23) | 5.12 (1) | 15.36 (3) |
| | 10.24 Note 1 | 235.52 (23) | 10.24 (1) | 30.72 (3) |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | | | |

#### 4A.2.3.1.4 Maximum allowed layers for multiple monitoring for UE category M1 in normal coverage

The requirements defined in section 4.7.2.1.4 shall apply.

#### 4A.2.3.1.5 Maximum interruption in paging reception for Category M1 UEs in normal coverage

The requirements defined in section 4.7.2.1.5 shall apply.

### 4A.2.3.2 Cell Re-selection requirements for UE category M1 in enhanced coverage

#### 4A.2.3.2.1 Measurement and evaluation of serving cell for UE category M1 in enhanced coverage

The requirements defined in section 4.7.2.2.1 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.2.1 shall apply with $N_{serv_EC}$ is defined in Table 4A.2.3.2.1-1.

**Table 4A.2.3.2.1-1: $N_{serv_EC}$ for UE configured with eDRX_IDLE cycle**

| eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $N_{serv}$ [number of DRX cycles] |
|---|---|---|
| 5.12 ≤eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | 8 |
| | 0.64 | 8 |
| | 1.28 | 4 |
| | 2.56 | 4 |
| | 5.12 | 4 |
| | 10.24 Note 1 | 4 |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | |

## 4A.2.3.2.2 Measurements of intra-frequency cells for UE category M1 in enhanced coverage

The requirements defined in section 4.7.2.2.2 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.2.2 shall apply with $T_{detect,EUTRAN_Intra_EC}$, $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,E\text{-}UTRAN_Intra_EC}$ are defined in Table 4A.2.3.2.2-1.

**Table 4A.2.3.2.2-1: $T_{detect,EUTRAN_Intra_EC}$, $T_{measure,EUTRAN_Intra_EC}$ and $T_{evaluate,E\text{-}UTRAN_Intra_EC}$ for UE configured with eDRX_IDLE cycle**

| SCH Ês/Iot of neighboring cell: Q2 [dB] | eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $T_{detect,EUTRAN_Intra_EC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_intra_EC_RSS}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|---|
| **-15≤ Q2 < -6** | 5.12 ≤eDRX_IDLE cycle length ≤ 2621.44 | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| | | 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| | | 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| | | 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| | | 5.12 | 2078.72 (406) | 5.12 (1) | 30.72 (6) | 25.6 (5) |
| | | 10.24 Note 1 | 4157.44 (406) | 10.24 (1) | 61.44 (6) | 51.2 (5) |
| **Q2≥-6** | | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| | | 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| | | 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| | | 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| | | 5.12 | 337.92 (26) | 5.12 (1) | 30.72 (6) | 25.6 (5) |
| | | 10.24 Note 1 | 675.84 (26) | 10.24 (1) | 61.44 (6) | 51.2 (5) |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | | | | | |

## 4A.2.3.2.3 Measurements of inter-frequency cells for UE category M1 in enhanced coverage

The requirements defined in section 4.7.2.2.3 shall apply when UE is not configured with eDRX_IDLE. When UE is configured with eDRX_IDLE, the requirements defined in section 4.7.2.2.3 shall apply with $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_EC}$ defined in Table 4A.2.3.2.3-1.

**Table 4A.2.3.2.3-1: $T_{detect,EUTRAN_Inter_EC}$, $T_{measure,EUTRAN_Inter_EC}$ and $T_{evaluate,\ E\text{-}UTRAN_inter_EC}$ for UE configured with eDRX_IDLE cycle**

| SCH Ês/Iot of neighboring cell: Q2 [dB] | eDRX_IDLE cycle length [s] | DRX_INACTIVE cycle length [s] | $T_{detect,EUTRAN_Inter_EC}$ [s] (number of DRX cycles) | $T_{measure,EUTRAN_Inter_EC}$ [s] (number of DRX cycles) | $T_{evaluate,E\text{-}UTRAN_inter_EC}$ [s] (number of DRX cycles) |
|---|---|---|---|---|---|
| **-15≤ Q2 < -6** | 5.12 ≤eDRX_IDLE | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) |
| | | 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) |
| | | 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) |

| | | | | | |
|---|---|---|---|---|---|
| | cycle length ≤ 2621.44 | 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) |
| | | 5.12 | 2078.72 (406) | 5.12 (1) | 30.72 (6) |
| | | 10.24 Note 1 | 4157.44 (406) | 10.24 (1) | 61.44 (6) |
| **Q2≥-6** | | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) |
| | | 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) |
| | | 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) |
| | | 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) |
| | | 5.12 | 337.92 (26) | 5.12 (1) | 30.72 (6) |
| | | 10.24 Note 1 | 675.84 (26) | 10.24 (1) | 61.44 (6) |
| Note 1: DRX_INACTIVE cycle length of 10.24s applies when eDRX_IDLE cycle length is >= 10.24s. | | | | | |

#### 4A.2.3.2.4 Maximum allowed layers for multiple monitoring for UE category M1 in enhanced coverage

The requirements defined in section 4.7.2.2.4 shall apply.

#### 4A.2.3.2.5 Maximum interruption in paging reception for Category M1 UEs in enhanced coverage

The requirements defined in section 4.7.2.2.5 shall apply.

### 4A.2.4 Channel quality report for UE Category M1 in idle mode

The requirements defined in section 4.7.3 shall apply.

# 5 E-UTRAN RRC_CONNECTED state mobility

Note 1: For the performance requirements specified hereafter, the state when no DRX is used is defined as follows:

- DRX and eDRX_CONN parameters are not configured; or
- DRX or eDRX_CONN parameters are configured and
  - drx-InactivityTimer is running; or
  - drx-RetransmissionTimer is running; or
  - mac-ContentionResolutionTimer is running; or
  - a Scheduling Request sent on PUCCH/SPUCCH is pending; or
  - an uplink grant for a pending HARQ retransmission can occur and there is data in the corresponding HARQ buffer; or
  - a PDCCH/SPDCCH indicating a new transmission addressed to the C-RNTI of the UE has not been received after successful reception of a Random Access Response for the explicitly signaled preamble (only applicable to UEs in RRC_CONNECTED).

Otherwise

- It is the state when DRX is used.

Note 2: Unless otherwise stated, the requirements in sections 5.1, 5.1.2.2, 5.1.2.3, 5.1.2.4, 5.3 and 5.4 are also applicable when a UE is configured with Scell(s) or PSCell.

## 5.1 E-UTRAN Handover

### 5.1.1 Introduction

The requirements in this clause are applicable to handover and conditional handover.

## 5.1.2 Requirements

### 5.1.2.1 E-UTRAN FDD – FDD

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers.

#### 5.1.2.1.1 Handover delay

Procedure delays for all procedures that can command a handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with normal or make-before-break handover.

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PUSCH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with RACH-less or combination of RACH-less and make-before-break handover.

Where:

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.1.2.1.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.1.2.2 when UE is configured with RACH-less handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.1.2.1 when UE is configured with make-before-break handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.1.2.2 when UE is configured with combination of make-before-break and RACH-less handover.

#### 5.1.2.1.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH when UE is configured with normal or make-before-break handover, or the time the UE starts transmission of new PUSCH when UE is configured with RACH-less or combination of make-before-break and RACH-less handover, excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH or on the new PUSCH.

##### 5.1.2.1.2.1 Interruption time for normal handover

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to 30 ms.

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.1 for intra-frequency handover and Clause 8.1.2.3.1 for inter-frequency handover.

#### 5.1.2.1.2.2 Interruption time for RACH-less handover

When intra-frequency or inter-frequency RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first PUSCH transmission occasion when UE is configured with RACH-less handover in the new cell.

- $T_{IU}$ can be up to 10 ms if UL grant is configured in RRC command.

NOTE: The actual value of $T_{IU}$ shall depend upon the UL grant configuration in RRC command.

- $T_{IU}$ can be up to $T_{UL_grant}$ if UL grant is not configured in RRC command.

NOTE: $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.1 for intra-frequency handover and Clause 8.1.2.3.1 for inter-frequency handover.

#### 5.1.2.1.2.3 Interruption time for make-before-break handover

When intra-frequency make-before-break handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 \text{ ms}$$

NOTE: The same bandwidth of source cell and target cell is assumed.

#### 5.1.2.1.2.4 Interruption time for combination of make-before-break and RACH-less handover

When intra-frequency combination of make-before-break and RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 + T_{UL_grant} \text{ ms}$$

Where:

- $T_{UL_grant}$ = 0 ms if UL grant is provided in RRC command.
- $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell if UL grant is not provided in RRC command.

NOTE: The same bandwidth of source cell and target cell is assumed.

### 5.1.2.2 E-UTRAN FDD – TDD

The requirements in this clause are applicable to handover from FDD to TDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.1.2.4 apply for this section.

5.1.2.2.1 (Void)

5.1.2.2.2 (Void)

### 5.1.2.3 E-UTRAN TDD – FDD

The requirements in this clause are applicable to handover from TDD to FDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.1.2.1 apply for this section.

5.1.2.3.1 (Void)

5.1.2.3.2 (Void)

### 5.1.2.4 E-UTRAN TDD – TDD

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers.

#### 5.1.2.4.1 Handover delay

Procedure delays for all procedures that can command a handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with normal or make-before-break handover.

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PUSCH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with RACH-less or combination of RACH-less and make-before-break handover.

Where:

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.4.2.1.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.4.2.2 when UE is configured with RACH-less handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.4.2.1 when UE is configured with make-before-break handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.4.2.2 when UE is configured with combination of make-before-break and RACH-less handover.

#### 5.1.2.4.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH when UE is configured with normal or make-before-break handover, or the time the UE starts transmission of new PUSCH when UE is configured with RACH-less or combination of make-before-break and RACH-less handover, excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH or on the new PUSCH.

##### 5.1.2.4.2.1 Interruption time for normal handover

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and

signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to 30 ms.

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.2 for intra-frequency handover and Clause 8.1.2.3.4 for inter-frequency handover.

#### 5.1.2.4.2.2 Interruption time for RACH-less handover

When intra-frequency or inter-frequency RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first PUSCH transmission occasion when UE is configured with RACH-less handover in the new cell.

- $T_{IU}$ can be up to 10 ms if UL grant is configured in RRC command.

NOTE: The actual value of $T_{IU}$ shall depend upon the UL grant configuration in RRC command.

- $T_{IU}$ can be up to $T_{UL_grant}$ if UL grant is not configured in RRC command.

NOTE: $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.2 for intra-frequency handover and Clause 8.1.2.3.2 for inter-frequency handover.

#### 5. 2.2.4.2.3 Interruption time for make-before-break handover

When intra-frequency make-before-break handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 \text{ ms}$$

NOTE: The same bandwidth of source cell and target cell is assumed.

#### 5. 2.2.4.2.4 Interruption time for combination of make-before-break and RACH-less handover

When intra-frequency combination of make-before-break and RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 + T_{UL_grant} \text{ ms}$$

Where:

- $T_{UL_grant}$ = 0 ms if UL grant is provided in RRC command.
- $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell if UL grant is not provided in RRC command.

NOTE: The same bandwidth of source cell and target cell is assumed.

### 5.1.2.5 E-UTRAN HD–FDD

The requirements in this clause are applicable to intra-frequency handovers.

#### 5.1.2.5.1 Handover delay

Procedure delays for all procedures that can command a handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with normal or make-before-break handover.

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PUSCH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command when UE is configured with RACH-less or combination of RACH-less and make-before-break handover.

Where:

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.5.2.1.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.5.2.2 when UE is configured with RACH-less handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.5.2.1 when UE is configured with make-before-break handover.

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.1.2.5.2.2 when UE is configured with combination of make-before-break and RACH-less handover.

#### 5.1.2.5.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH when UE is configured with normal or make-before-break handover, or the time the UE starts transmission of new PUSCH when UE is configured with RACH-less or combination of make-before-break and RACH-less handover, excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH or on the new PUSCH.

##### 5.1.2.5.2.1 Interruption time for normal handover

When intra-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to 30 ms.

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.5.2.1.2 for intra-frequency handover.

##### 5.1.2.5.2.2 Interruption time for RACH-less handover

When intra-frequency RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first PUSCH transmission occasion when UE is configured with RACH-less handover in the new cell.

- $T_{IU}$ can be up to 10 ms if UL grant is configured in RRC command.

NOTE: The actual value of $T_{IU}$ shall depend upon the UL grant configuration in RRC command.

- $T_{IU}$ can be up to $T_{UL_grant}$ if UL grant is not configured in RRC command.

NOTE: $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.5.2.1.2 for intra-frequency handover.

#### 5. 2.2.5.2.3 Interruption time for make-before-break handover

When intra-frequency make-before-break handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 \text{ ms}$$

NOTE: The same bandwidth of source cell and target cell is assumed.

#### 5. 2.2.5.2.4 Interruption time for combination of make-before-break and RACH-less handover

When intra-frequency combination of make-before-break and RACH-less handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = 5 + T_{UL_grant} \text{ ms}$$

Where:

- $T_{UL_grant}$ = 0 ms if UL grant is provided in RRC command.
- $T_{UL_grant}$ is the time required to acquire and process uplink grant from the target Pcell if UL grant is not provided in RRC command.

NOTE: The same bandwidth of source cell and target cell is assumed.

### 5.1.2.6 E-UTRAN FDD – FDD conditional handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency conditional handovers.

#### 5.1.2.6.1 Handover delay

Procedure delays for all procedures that can command a conditional handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying conditional handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command.

$$D_{handover} = T_{RRC} + T_{Event_DU} + T_{measure} + T_{CHO_execution} + T_{interrupt}$$

Where:

$T_{RRC}$ is the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2].

$T_{Event_DU}$ is the delay uncertainty which is the time from when the UE successfully decodes a conditional handover command until a condition exists at the measurement reference point which will trigger the conditional handover.

$T_{measure}$ is the measurements time stated in clause 5.1.2.6.2.

$T_{CHO_execution}$ is the conditional execution preparation time in clause 5.1.2.6.3.

$T_{interrupt}$ is the interruption time stated in clause 5.1.2.6.4.

#### 5.1.2.6.2 Measurement time

The measurement time delay $T_{measure}$ is defined as the time period from the end of $T_{Event_DU}$ until the UE begins the preparation time for handover execution .

The measurement event evaluation delay measured without Time To Trigger (TTT) and L3 filtering shall be less than $T_{identify\ intra}$ defined in clause 8.1.2.2.1 (FDD) and 8.1.2.2.2 (TDD) for intra-frequency conditional handover or $T_{identify\ inter}$ defined in clause 8.1.2.3.1 (FDD) and 8.1.2.3.2 (TDD) for inter-frequency conditional handover. When TTT or L3 filtering is used or the UE is performing reception and/or transmission of ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra}$ defined in clause 8.1.2.2.1. (FDD) and 8.1.2.2.2 (TDD) or $T_{identify\ inter}$ defined in clause 8.1.2.3.1 (FDD) and 8.1.2.3.2 (TDD) becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers a handover, the measurement time delay shall be less than $T_{Measurement_Period,\ Intra}$ or $T_{Measurement_Period,\ Inter}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 5.1.2.6.3 Preparation time

Preparation time is the time when the UE prepares the target cell for conditional handover. It begins after measurement time.

$T_{CHO_execution}$ is the time needed for preparing the conditional handover to the target cell.

$T_{CHO_execution}$ can be up to 10 ms.

#### 5.1.2.6.4 Interruption time

The interruption time is the time between when the UE completes the preparation time $T_{CHO_execution}$ and the time when the UE starts the transmission of the PRACH to the target cell.

For intra-frequency or inter-frequency conditional handover, the interruption time shall be less than

$$T_{interrupt} = T_{IU} + 20 \text{ ms}$$

Where:

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to 30 ms.

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.1 (FDD) and 8.1.2.2.2 (TDD) (FDD) and 8.1.2.2.2 (TDD) for intra-frequency conditional handover and Clause 8.1.2.3.1 (FDD) and 8.1.2.3.2 (TDD) for inter-frequency conditional handover.

### 5.1.2.7 E-UTRAN FDD – TDD conditional handover

The requirements in this clause are applicable to conditional handover from FDD to TDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.1.2.6 apply for this section.

#### 5.1.2.8 E-UTRAN TDD – FDD conditional handover

The requirements in this clause are applicable to conditional handover from TDD to FDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.1.2.6 apply for this section.

#### 5.1.2.9 E-UTRAN TDD – TDD conditional handover

The requirements in this clause are applicable to handover from TDD to TDD. The requirements in this clause shall apply to UE supporting TDD.

The requirements in clause 5.1.2.6 apply for this section.

## 5.2 Void

## 5.3 Handover to other RATs

### 5.3.1 E-UTRAN - UTRAN FDD Handover

#### 5.3.1.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to UTRAN FDD is to change the radio access mode from E-UTRAN to UTRAN FDD. The handover procedure is initiated from E-UTRAN with a RRC message that implies a hard handover as described in TS 36.331 [2].

##### 5.3.1.1.1 Handover delay

When the UE receives a RRC message implying handover to UTRAN the UE shall be ready to start the transmission of the new UTRA uplink DPCCH within $D_{handover}$ seconds from the end of the last E-UTRAN TTI containing the RRC MOBILITY FROM E-UTRA command.

where:

- $D_{handover}$ equals the RRC procedure delay, which is 50 ms plus the interruption time stated in clause 5.3.1.1.2.

##### 5.3.1.1.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the E-UTRAN PDSCH and the time the UE starts transmission on the uplink DPCCH in UTRAN FDD, excluding the RRC procedure delay. The interruption time depends on whether the target cell is known to the UE or not.

The target cell is known if it has been measured by the UE during the last 5 seconds otherwise it is unknown. The UE shall always perform a UTRA synchronisation procedure as part of the handover procedure.

If the target cell is known the interruption time shall be less than $T_{interrupt1}$

$$T_{interrupt1} = T_{IU}+T_{sync}+50+ 10*F_{max} + T_{MC} \text{ ms}$$

If the target cell is unknown the interruption time shall be less than $T_{interrupt2}$

$$T_{interrupt2} = T_{IU}+T_{sync}+150 + 10*F_{max} + T_{MC} \text{ ms}$$

This requirement shall be met, provided that there is one target cell in the MOBILITY FROM E-UTRA command. Performance requirements for E-UTRA to UTRA soft handover are not specified. When UE is connected to an E-UTRA cell, UTRA SFN timing measurements are not reported. This implies that the timing of the DPCH of the UTRA target cells in the active set cannot be configured by UTRAN to guarantee that all target cells fall within the UE reception window of $T_0$ +/- 148 chips.

Where:

$T_{IU}$ is the interruption uncertainty when changing the timing from the E-UTRAN to the new UTRAN cell. $T_{IU}$ can be up to one UTRA frame (10 ms).

$F_{max}$ denotes the maximum number of radio frames within the transmission time intervals of all transport channels that are multiplexed into the same CCTrCH on the UTRA target cell. If HS-PDSCH is configured in the UTRA target cell, $F_{max}$ is 4 radio frames.

$T_{sync}$ is the time required for measuring the downlink DPCCH channel as stated in TS 25.214 [20], clause 4.3.1.2. In case higher layers indicate the usage of a post-verification period $T_{sync}$=0 ms. Otherwise $T_{sync}$=40 ms.

$T_{MC}$ $T_{MC}$ is 0ms if a single UTRA cell is configured as the handover target, otherwise 20ms if handover to UTRA with 1, 2 or 3 UTRA carriers with secondary HS-PDSCH is configured.

The phase reference is the primary CPICH.

The requirements in this clause assume that N312 has the smallest possible value i.e. only one insync is required.

## 5.3.2 E-UTRAN - UTRAN TDD Handover

### 5.3.2.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to UTRAN TDD is to change the radio access mode from E-UTRAN to UTRAN TDD. The handover procedure is initiated from E-UTRAN with a RRC message that implies a hard handover as described in TS 36.331 [2].

### 5.3.2.2 Requirements

The requirements in this clause shall apply to UE supporting E-UTRAN and UTRAN TDD.

#### 5.3.2.2.1 Handover delay

When the UE receives a RRC message implying E-UTRAN/UTRAN TDD handover the UE shall be ready to start the transmission of the SYNC-UL within $D_{handover}$ seconds from the end of the last TTI containing the RRC MOBILITY FROM E-UTRA command.

Where:

- $D_{handover}$ equals the RRC procedure delay, which is 50 ms plus the interruption time stated in clause 5.3.2.2.2.

#### 5.3.2.2.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the E-UTRAN PDSCH and the time the UE starts transmission on the SYNC-UL in UTRAN TDD, excluding the RRC procedure delay. The interruption time depends on whether the target cell is known to the UE or not.

The UE shall always perform a UTRA synchronisation procedure as part of the handover procedure.

If the target cell has been measured by the UE during the last 5 seconds, the interruption time shall be less than $T_{interrupt1}$

$$T_{interrupt1} = T_{offset} + T_{UL} + 30 * F_{SFN} + 20 \text{ ms}$$

If the target cell has not been measured by the UE during the last 5 seconds, the interruption time shall be less than $T_{interrupt2}$

$$T_{interrupt2} = T_{offset} + T_{UL} + 30 * F_{SFN} + 180 \text{ ms}$$

Where:

$T_{offset}$ Equal to 10 ms, the frame timing uncertainty between the old cell and the target cell and the time that can elapse until the appearance of a Beacon channel

$T_{UL}$ Equal to 10 ms, the time that can elapse until the appearance of the UL timeslot in the target cell

$F_{SFN}$ Equal to 1 if SFN decoding is required and equal to 0 otherwise

The interruption time requirements for an unknown target cell shall apply only if the signal quality of the unknown target cell is sufficient for successful synchronisation with one attempt.

## 5.3.3 E-UTRAN - GSM Handover

### 5.3.3.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to GSM is to transfer a connection between the UE and E-UTRAN to GSM. The handover procedure is initiated from E-UTRAN with a RRC message (MOBILITY FROM E-UTRA). The procedure is described in in TS 36.331 [2].

### 5.3.3.2 Requirements

The requirements in this clause shall apply to UE supporting E-UTRAN and GSM.

The requirements given below in Tables 5.3.3.2.1-1 and 5.3.3.2.2-1 for the case where the UE has not synchronised to the GSM cell before receiving the RRC MOBILITY FROM E-UTRA command are valid when the signal quality of the GSM cell is sufficient for successful synchronisation with one attempt. If the UE is unable to synchronise to the GSM cell on the first attempt, it shall continue to search for synchronisation information for up to 800 ms duration. If after 800 ms the UE has not synchronised to the GSM cell it shall follow the handover failure procedure specified in TS 36.331 [2].

#### 5.3.3.2.1 Handover delay

When the UE receives a RRC MOBILITY FROM E-UTRA command the UE shall be ready to transmit (as specified in [10]) on the channel of the new RAT within the value in table 5.3.3.2.1-1 from the end of the last TTI containing the RRC command. The UE shall process the RRC procedures for the MOBILITY FROM E-UTRA command within 50 ms, which is noted as RRC procedure delay.

**Table 5.3.3.2.1-1: E-UTRAN/GSM handover - handover delay**

| UE synchronisation status | handover delay [ms] |
|---|---|
| The UE has synchronised to the GSM cell before the RRC MOBILITY FROM E-UTRA COMMAND is received | 90 |
| The UE has not synchronised to the GSM cell before the RRC MOBILITY FROM E-UTRA COMMAND is received | 190 |

#### 5.3.3.2.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the E-UTRAN PDSCH and the time the UE starts transmission on the uplink channel in GSM, excluding the RRC procedure delay. The interruption time depends on whether the UE has synchronized to the target GSM cell or not and shall be less than the value specified in table 5.3.3.2.2-1.

**Table 5.3.3.2.2-1: E-UTRAN/GSM handover - interruption time**

| Synchronisation status | Interruption time [ms] |
|---|---|
| The UE has synchronised to the GSM cell before the RRC MOBILITY FROM E-UTRA COMMAND is received | 40 |
| The UE has not synchronised to the GSM cell before the RRC MOBILITY FROM E-UTRA COMMAND is received | 140 |

## 5.3.4 E-UTRAN - NR FR1 Handover

### 5.3.4.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to NR in FR1 is to transfer a connection between the UE and E-UTRAN to NR in FR1. The handover procedure is initiated from E-UTRAN with a RRC message (MOBILITY FROM E-UTRA). The procedure is described in in TS 36.331 [2].

### 5.3.4.2 Handover delay

When the UE receives a RRC message implying inter-RAT handover to the UE shall be ready to start the transmission of the uplink PRACH channel in NR within $D_{handover}$ seconds from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interruption}$$

Where:

$T_{RRC_procedure_delay}$: it is the RRC procedure delay which is 50 ms.

$T_{interruption}$: it is the time between end of the last TTI containing the RRC command on the PDSCH in E-UTRAN and the time the UE starts transmission of the PRACH in NR, excluding $T_{RRC_procedure_delay}$. $T_{interruption}$ is defined in clause 5.3.4.3.

### 5.3.4.3 Interruption time

When inter-RAT handover to NR is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{rs} + T_{processing} + T_{margin} \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is an unknown cell and target cell Es/Iot $\geq$ -2 dB, then $T_{search} = 3 \cdot T_{rs}$ ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{processing}$ is time for UE processing. $T_{processing}$ can be up to 20 ms.

$T_{margin}$ is time for SSB post-processing. $T_{margin}$ can be up to 2 ms.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [39].

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

$T_{rs}$ is the SMTC period of the taget NR cell if the UE has been provided with an SMTC configuration for the target cell prior to, or in the handover command, otherwise $T_{rs}$ is the target cell SSB transmission period, if such is provided. If the UE is not provided with an SMTC configuration or SSB transmission period, the requirement in this section is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If UE is provided with both SMTC configuration and SSB transmission period the requirement shall be based on SMTC periodicity.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in clause 8.1.2.4.21 and 8.1.2.4.22.

## 5.3.4A E-UTRAN - NR FR1 Handover to target cell using CCA

### 5.3.4A.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to NR in FR1 in carrier frequencies with CCA is to transfer a connection between the UE and E-UTRAN to NR in FR1 carrier frequencies with CCA. The handover procedure is initiated from E-UTRAN with an RRC message (MOBILITY FROM E-UTRA). The procedure is described in TS 36.331 [2].

In the requirements of clause 5.3.4A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding detection or time tracking period; otherwise the SMTC occasion is considered as available at the UE.

In the requirements of clause 5.3.4A, the term PRACH occasion unavailable for transmission refers to when the PRACH occasion is configured by gNB at the UE but not transmitted by the UE during the corresponding period due to UL CCA failures at the UE; otherwise the PRACH occasion is considered as available for transmission.

### 5.3.4A.2 Handover delay

When the UE receives an RRC message implying inter-RAT handover to the UE shall be ready to start the transmission of the uplink PRACH channel in NR within $D_{handover}$ seconds from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interruption}$$

Where:

$T_{RRC_procedure_delay}$: it is the RRC procedure delay which is [50] ms.

$T_{interruption}$: it is the time between end of the last TTI containing the RRC command on the PDSCH in E-UTRAN and the time the UE starts transmission of the PRACH in NR, excluding $T_{RRC_procedure_delay}$. $T_{interrupt}$ is defined in clause 5.3.4A.3.

### 5.3.4A.3 Interruption time

When inter-RAT handover to NR is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{rs} + T_{processing} + T_{margin} \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is an unknown cell and target cell Es/Iot $\geq$ [-2] dB, then $T_{search} = (3+L_1') * T_{rs}$ ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$L_1'$ is the number of SMTC occasions not available at the UE during the inter-RAT detection period. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{processing}$ is time for UE processing. $T_{processing}$ can be up to 20 ms.

$T_{margin}$ is time for SSB post-processing. $T_{margin}$ can be up to 2 ms.

$T_{IU}$ is the interruption uncertainty due to the random access procedure when sending PRACH to the new cell. $T_{IU}$ can be up to: $(1+ L_3)*T_{SSB,RO}$ + 10 ms; where $T_{SSB,RO}$ is the SSB to PRACH occasion association period as defined in Table 8.1-1 of TS 38.213 [39] and $L_3$ is the number of consecutive SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. $L_3$ = 0 for Type 2C UL channel access procedure as defined in TS 37.213 [57]. When the UE is configured with both the UL BWP with PRACH occasion on the target cell and UL LBT failure detection/recovery, the interruption can be longer.

NOTE 1: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

NOTE 2: The interruption time extended by $L_1'$ and $L_3$ parameters, and by the UL LBT failure detection/recovery mechanism is limited by the T304 timer. The UE behaviour at the T304 timer expiry is specified in TS 38.331 [38].

$T_{rs}$ is the SMTC period of the taget NR cell if the UE has been provided with an SMTC configuration for the target cell prior to, or in the handover command, otherwise $T_{rs}$ is the target cell SSB transmission period, if such is provided. If the UE is not provided with an SMTC configuration or SSB transmission period, the requirement in this section is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If UE is provided with both SMTC configuration and SSB transmission period the requirement shall be based on SMTC periodicity.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in clause 8.1.2.4.21A, and 8.1.2.4.22A.

## 5.3.5 E-UTRAN - NR FR2 Handover

### 5.3.5.1 Introduction

The purpose of inter-RAT handover from E-UTRAN to NR in FR2 is to transfer a connection between the UE and E-UTRAN to NR in FR2. The handover procedure is initiated from E-UTRAN with a RRC message (MOBILITY FROM E-UTRA). The procedure is described in in TS 36.331 [2].

### 5.3.5.2 Handover delay

When the UE receives a RRC message implying inter-RAT handover to the UE shall be ready to start the transmission of the uplink PRACH channel in NR within $D_{handover}$ seconds from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interruption}$$

Where:

$T_{RRC_procedure_delay}$: it is the RRC procedure delay which is 50 ms.

$T_{interruption}$: it is the time between end of the last TTI containing the RRC command on the PDSCH in E-UTRAN and the time the UE starts transmission of the PRACH in NR, excluding $T_{RRC_procedure_delay}$. $T_{interruption}$ is defined in clause 5.3.5.3.

### 5.3.5.3 Interruption time

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{rs} + T_{processing} + T_{margin} \text{ ms}$$

Where:

$T_{search}$ is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. If the target cell is unknown and the target cell Es/Iot $\geq$ -2 dB, then $T_{search} = 24 \cdot T_{rs}$ periodicity. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{processing}$ is time for UE processing. $T_{processing}$ can be up to 40 ms.

$T_{margin}$ is time for SSB post-processing. $T_{margin}$ can be up to 2 ms.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [39].

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

$T_{rs}$ is the SMTC period of the taget NR cell if the UE has been provided with an SMTC configuration for the target cell prior to, or in the handover command, otherwise $T_{rs}$ is the taget cell SSB transmission period, if such is provided. If the UE is not provided with an SMTC configuration or SSB transmission period, the requirement in this section is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If UE is provided with both SMTC configuration and SSB transmission period the requirement shall be based on SMTC periodicity.

Relevant cell identification requirements are described in clause 8.1.2.4.20, 8.1.2.4.22, 8.1.2.4.22 and 8.1.2.4.20.

In FR2, the target cell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the handover command:

- the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3 of TS 38.133 [29],
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3 of TS 38.133 [29].

otherwise it is unknown.

# 5.4 Handover to Non-3GPP RATs

## 5.4.1 E-UTRAN – HRPD Handover

### 5.4.1.1 Introduction

The handover procedure from E-UTRAN to HRPD is initiated when E-UTRAN sends handover command to the UE through dedicated RRC signalling.

#### 5.4.1.1.1 Handover delay

The handover delay ($D_{handover}$) is defined as the sum of the RRC procedure delay, which is 50 ms and the interruption time specified in clause 5.4.1.1.2.

When the UE receives a RRC message implying handover to HRPD, the UE shall be ready to start the transmission of the new reverse control channel in HRPD within $D_{handover}$ from the end of the last E-UTRAN TTI containing the RRC command.

#### 5.4.1.1.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the E-UTRAN PDSCH and the time the UE starts transmission of the reverse control channel in HRPD, excluding the RRC procedure delay. The interruption time depends on whether the target cell is known to the UE or not.

An HRPD cell is known if it has been measured by the UE during the last 5 seconds otherwise it is unknown. Under the reference conditions specified in sub-clause 6.6 of [13], the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{IU} + 40 + 10*KC*SW_K + 10*OC*SW_O \text{ ms}$$

Where:

$T_{IU}$ It is the interruption uncertainty when changing the timing from the E-UTRAN to the new HRPD cell. $T_{IU}$ can be up to one HRPD frame (26.66 ms).

$SW_K$ is $SW_K = \left\lceil \frac{srch_win_k}{60} \right\rceil$ where srch_win_k is the number of HRPD chips indicated by the search window for known target HRPD cells in the message

$SW_O$ is $SW_O = \left\lceil \frac{srch_win_o}{60} \right\rceil$ where srch_win_o is the number of HRPD chips indicated by the search window for unknown target HRPD cells in the message

KC It is the number of known target HRPD cells in the message, and

OC It is the number of unknown target HRPD cells in the message.

Note: An additional delay in the interruption time may occur due to the reverse link silence interval [11], which is specific to HRPD.

## 5.4.2 E-UTRAN – cdma2000 1X Handover

### 5.4.2.1 Introduction

The handover procedure from E-UTRAN to cdma2000 1X is initiated when E-UTRAN sends handover command to the UE through dedicated RRC signalling.

#### 5.4.2.1.1 Handover delay

The handover delay ($D_{handover}$) is defined as the sum of the RRC procedure delay, which is 130 ms and the interruption time specified in clause 5.4.2.1.2.

When the UE receives a RRC message implying handover to cdma2000 1X, the UE shall be ready to start the transmission of the new reverse control channel in cdma2000 1X within $D_{handover}$ from the end of the last E-UTRAN TTI containing the RRC command.

#### 5.4.2.1.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the E-UTRAN PDSCH and the time the UE starts transmission of the reverse control channel in cdma2000 1X, excluding the RRC procedure delay. The interruption time depends on whether the target cell is known to the UE or not.

A cdma2000 1X cell is known if it has been measured by the UE during the last 5 seconds otherwise it is unknown. Under the reference conditions specified in sub-clause 4.2.1 of [14], the interruption time shall be less than $T_{interrupt}$:

$$T_{interrupt} = T_{IU} + 140 + 10*KC*SW_K + 10*OC*SW_O \text{ ms}$$

Where:

$T_{IU}$ It is the interruption uncertainty when changing the timing from the E-UTRAN to the new cdma2000 1X cell. $T_{IU}$ can be up to one cdma2000 1X frame (20 ms).

$SW_K$ is $SW_K = \left\lceil \frac{srch_win_k}{300} \right\rceil$ where srch_win_k is the number of cdma2000 1x chips indicated by the search window for known target cdma2000 1x cells in the message

$SW_O$ is $SW_O = \left\lceil \frac{srch_win_o}{300} \right\rceil$ where srch_win_o is the number of cdma2000 1x chips indicated by the search window for unknown target cdma2000 1x cells in the message

KC It is the number of known target cdma2000 1X cells in the message, and

OC It is the number of unknown target cdma2000 1X cells in the message.

# 5.5 E-UTRAN Handover for Cat-M1 UEs

## 5.5.1 Introduction

This section defines the E-UTRAN intra-frequency handover requirements and inter-frequency handover requirements for Cat-M1 UEs in CEModeA as required by TS 36.300 [25].

## 5.5.2 Requirements in CEModeA

### 5.5.2.1 E-UTRAN FDD – FDD for Cat-M1 FDD UEs

The requirements in this clause are applicable to FDD intra-frequency handovers and FDD inter-frequency handovers for a Cat-M1 FDD UE in CEModeA.

#### 5.5.2.1.1 Handover delay

Procedure delays for all procedures that can command a handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying handover the UE shall finish the transmission of all repetitions of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command,

Where:

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.5.2.1.2.

#### 5.5.2.1.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the old PDSCH and the moment the UE has transmitted all repetitions of PRACH in the target cell, excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH.

When intra-frequency handover or inter-frequency handover is commanded and the field *sameSFN-Indication* and *mib-RepetitionStatus* [2] are included in the handover command then the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

When intra-frequency handover or inter-frequency handover is commanded and the field *sameSFN-Indication* or *mib-RepetitionStatus* [2] is not included in the handover command then UE the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{MIB} + T_{IU} + 20 \text{ ms}$$

Where:

- $T_{search}$ is the time required to search the target cell when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Otherwise, $T_{search}$ shall be according to the non-DRX cell identification requirements specified in Clause 8.13.2.1 for intra-frequency handover for a UE configured with CEModeA or $T_{search}$ shall be according to the non-DRX cell identification requirements specified in Clause 8.13.2.6 for inter-frequency handover for a UE configured with CEModeA. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

- $T_{MIB}$ is the time required for acquiring the MIB information of the target cell.

- $T_{IU}$ is the time required to complete the transmission of PRACH in the target cell. The actual value of $T_{IU}$ shall depend upon the uncertainity in acquiring the first available PRACH occasion based on the PRACH configuration used in the target cell and the PRACH coverage enhancement level used by the UE for sending the random access preamble to the target cell.

- In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement for a time duration equal or longer than the time duration required for the cell identification. Otherwise, it is unknown. For intra-frequency handover the time duration required for the cell identification is specified in relevant intra-frequency cell identification requirements as described in Clause 8.13.2.1 for CEModeA. For inter-frequency handover the time duration required for the cell identification is specified in relevant inter-frequency cell identification requirements as described in Clause 8.13.2.6 for CEModeA.

### 5.5.2.2 E-UTRAN FDD – FDD for Cat-M1 HD – FDD UEs

The requirements defined in clause 5.5.2.1 are applicable to FDD intra-frequency handovers and FDD inter-frequency handovers for a Cat-M1 HD-FDD UE in CEModeA.

### 5.5.2.3 E-UTRAN TDD – TDD for Cat-M1 TDD UEs

The requirements defined in clause 5.5.2.1 are applicable to TDD intra-frequency handovers and TDD inter-frequency handovers for a Cat-M1 TDD UE in CEModeA.

5.5.2.3.1 Void

5.5.2.3.2 Void

## 5.5.3 Requirements in CEModeB

### 5.5.3.1 E-UTRAN FDD – FDD for Cat-M1 FDD UEs

The requirements in this clause are applicable to FDD intra-frequency handovers and FDD inter-frequency handover for a Cat-M1 FDD UE configured with CEModeB.

#### 5.5.3.1.1 Handover delay

Procedure delays for all procedures that can command a handover are specified in TS 36.331 [2].

When the UE receives a RRC message implying handover the UE shall finish the transmission of all repetitions of the new uplink PRACH channel within $D_{handover}$ seconds from the end of the last TTI containing the RRC command,

Where:

$D_{handover}$ equals the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] plus the interruption time stated in clause 5.5.3.1.2.

#### 5.5.3.1.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay. This requirement applies when UE is not required to perform any synchronisation procedure before transmitting on the new PRACH.

When intra-frequency handover or inter-frequency handover is commanded and the field *sameSFN-Indication* and *mib-RepetitionStatus* [2] are included in the handover command then the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + 20 \text{ ms}$$

When intra-frequency handover or inter-frequency handover is commanded and the field *sameSFN-Indication* or *mib-RepetitionStatus* [2] is not included in the handover command then the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{MIB} + T_{IU} + 20 \text{ ms}$$

Where:

- $T_{search}$ is the time required to search the target cell when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Otherwise, $T_{search}$ shall be according to the non-DRX cell identification requirements specified in Clause 8.13.3.1 for intra-frequency handover for a UE configured with CEModeB or $T_{search}$ shall be according to the non-DRX cell identification requirements specified in Clause 8.13.3.5 for inter-frequency handover for a UE configured with CEModeB. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

- $T_{MIB}$ is the time required for acquiring the MIB information of the target cell.

- $T_{IU}$ is the time required to complete the transmission of PRACH in the target cell. The actual value of $T_{IU}$ shall depend upon the uncertainity in acquiring the first available PRACH occasion based on the PRACH configuration used in the target cell and the PRACH coverage enhancement level used by the UE for sending the random access preamble to the target cell.

- In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement for a time duration equal or longer than the time duration required for the cell identification. Otherwise, it is unknown. For intra-frequency handover the time duration required for the cell identification is specified in relevant intra-frequency cell identification requirements as described in Clause 8.13.3.1 for CEModeB. For inter-frequency handover the time duration required for the cell identification is specified in relevant inter-frequency cell identification requirements as described in Clause 8.13.3.5 for CEModeB.

#### 5.5.3.2 E-UTRAN FDD – FDD for Cat-M1 HD – FDD UEs

The requirements defined in clause 5.5.3.1 are applicable to FDD intra-frequency handovers and FDD inter-frequency handovers for a Cat-M1 HD-FDD UE configured with CEModeB.

#### 5.5.3.3 E-UTRAN TDD – TDD for Cat-M1 TDD UEs

The requirements defined in clause 5.5.3.1 are applicable to TDD intra-frequency handovers and TDD inter-frequency handovers for a Cat-M1 TDD UE configured with CEModeB.

## 5.6 Void

## 5.7 E-UTRAN DAPS Handover

### 5.7.1 Introduction

The purpose of DAPS handover is to change the PCell to another cell.

A DAPS handover is synchronous if it meets the conditions in Table 5.7.1-1, otherwise it is asynchronous.

**Table 5.7.1-1: Synchronous conditions for DAPS handover**

| Type of handover | Maximum receive timing difference between source and target cells (μs) for sync DAPS handover | Maximum transmit timing difference between source and target cells (μs) for sync DAPS handover |
|---|---|---|
| Intra-frequency Note 1,2,3 | 6μs | 8.21 μs |
| Intra-band inter-frequency Note 1,2,3 | 6μs | 8.21 μs |
| Inter-band inter-frequency | 33 μs | 35.21 μs |
| Note 1: For synchronous DAPS handover, if the receive time difference exceeds the cyclic prefix length, demodulation performance degradation is expected for the first symbol of the slot. For asynchronous DAPS handover, if the receive time difference exceeds the cyclic prefix length, interruptions may occur depending on UE implementation. The duration and frequency of occurrence of such interruptions is not specified.<br>Note 2: For DAPS handover on a TDD band, after starting RACH procedure, a UE is not required to transmit in the uplink to any of source and target cells earlier than 20us after the end of the last received downlink symbol from any of source and target cells in the same TDD band.<br>Note 3: For DAPS handover on a TDD band, after starting RACH procedure, a UE is not required to receive in the downlink from any of source and target cells earlier than 20us after the end of the last transmitted uplink symbol to any of source and target cells in the same TDD band. | | |

### 5.7.2 Requirements

#### 5.7.2.1 E-UTRAN FDD – FDD

The requirements in this clause are applicable to both intra-frequency and inter-frequency DAPS handovers.

##### 5.7.2.1.1 DAPS Handover delay

Procedure delays for the procedure that can command a DAPS handover are specified in TS 36.331 [2]. DAPS delay is comprised of $D_{handover1}$ and $D_{handover2}$.

When the UE receives an RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover1}$ seconds from the end of the last TTI containing the RRC command when UE is configured with dual active protocol stack handover.

$$D_{handover1} = T_{RRC_procedure} + T_{search} + T_{IU} + 20 \text{ ms}$$

Where

$T_{RRC_procedure}$ is the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2].

$T_{search}$ is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search}$ = 80 ms. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

$T_{IU}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. $T_{IU}$ can be up to 30 ms.

NOTE: The actual value of $T_{IU}$ shall depend upon the PRACH configuration used in the target cell.

A cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 8.1.2.2.1 (FDD) and Clause 8.1.2.2.2 (TDD) for intra-frequency handover and Clause 8.1.2.3.1 (FDD) and Clause 8.1.2.3.2 (TDD) for inter-frequency handover.

After successful RACH procedure of the target cell, when the UE receives an RRC message implying source cell release command, the UE shall accomplish the release actions specified in TS 36.331 [2] within $D_{handover2}$.

$$D_{handover2} = T_{RRC_procedure} + T_{interrupt2}$$

Where:

$T_{RRC_procedure}$ is the maximum RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ is defined in clause 5.7.2.1.2.

#### 5.7.2.1.2 Interruption time

During $D_{handover1}$ the UE is allowed an interruption of up to $T_{interrupt1}$ on source cell:

- $T_{interrupt1}$ is 1 ms for synchronous intra-frequency DAPS handover and 2ms for asynchronous intra-frequency DAPS handover, when the bandwidth of target cell is no larger than the bandwidth of source cell,
- $T_{interrupt1}$ is 2ms for synchronous intra-frequency DAPS handover and 3ms for asynchronous intra-frequency DAPS handover, when the bandwidth of target cell is larger than the bandwidth of source cell,
- $T_{interrupt1}$ is 5 ms for synchronous intra-band inter-frequency DAPS handover and 6 ms for asynchronous intra-band inter-frequency DAPS handover
- $T_{interrupt1}$ is 1 ms for synchronous inter-band inter-frequency DAPS handover and 2 ms for asynchronous inter-band inter-frequency DAPS handover.

During $D_{handover2}$ the UE is allowed an interruption of up to $T_{interrupt2}$ on target cell:

- $T_{interrupt2}$ is 2 ms for synchronous intra-frequency DAPS handover and 3 ms for asynchronous intra-frequency DAPS handover, when the bandwidth of target cell is smaller than the bandwidth of source cell.
- $T_{interrupt2}$ is 1 ms for synchronous intra-frequency DAPS handover and 2 ms for asynchronous intra-frequency DAPS handover, when the bandwidth of target cell is not smaller than the bandwidth of source cell
- $T_{interrupt2}$ is 5 ms for synchronous intra-band inter-frequency DAPS handover and 6 ms for asynchronous intra-band inter-frequency DAPS handover.
- $T_{interrupt2}$ is 1 ms for synchronous inter-band inter-frequency DAPS handover and 2 ms for asynchronous inter-band inter-frequency DAPS handover.

### 5.7.2.2 E-UTRAN FDD – TDD

The requirements in this clause are applicable to DAPS handover from FDD to TDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.7.2.1 apply for this section.

#### 5.7.2.3 E-UTRAN TDD – FDD

The requirements in this clause are applicable to DAPS handover from TDD to FDD. The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 5.7.2.1 apply for this section.

#### 5.7.2.4 E-UTRAN TDD – TDD

The requirements in this clause are applicable to DAPS handover from TDD to TDD. The requirements in this clause shall apply to UE supporting TDD.

The requirements in clause 5.7.2.1 apply for this section.

# 6 RRC Connection Mobility Control

## 6.1 RRC Re-establishment

The requirements in this clause are applicable to both E-UTRAN FDD and TDD.

### 6.1.1 Introduction

RRC connection re-establishment is initiated when a UE in RRC connected mode looses RRC connection due to any of these reasons: radio link failure, handover failure or radio link problem. The RRC es-tablishment procedure is specified in clause 5.3.7 in TS 36.331 [2].

### 6.1.2 Requirements

In RRC connected mode the UE shall be capable of sending *RRCConnectionReestablishmentRequest* message within $T_{re\text{-}establish_delay}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re\text{-}establish_delay}$) shall be less than:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}$$

$T_{UL_grant}$: It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit *RRCConnectionReestablishmentRequest* message.

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) is specified in clause 6.1.2.1.

#### 6.1.2.1 UE Re-establishment delay requirement

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 36.331 [2] is detected by the UE to the time when the UE sends PRACH to the target PCell. The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) requirement shall be less than:

$$T_{UE\text{-}re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * Tsearch + T_{SI} + T_{PRACH}$$

$T_{search}$: It is the time required by the UE to search the target PCell.

$T_{search}$ = It is 100 ms if the target PCell is known by the UE; the target PCell is known if it has been measured by the UE in the last 5 seconds.

$T_{search}$ = It is 800 ms if the target PCell is unknown by the UE; the target PCell is unknown if it has not been measured by the UE in the last 5 seconds.

$T_{SI}$ = It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for the target PCell.

$T_{PRACH}$ = The additional delay caused by the random access procedure; it will be at least 10 ms due to random access occasion and there might be additional delay due to ramping procedure.

$N_{freq}$: It is the total number of E-UTRA frequencies to be monitored for RRC re-establishment; $N_{freq}$ = 1 if the target PCell is known.

There is no requirement if the target cell does not contain the UE context.

# 6.2 Random Access

## 6.2.1 Introduction

The random access procedure is used when establishing the layer 1 communication between the UE and E-UTRAN. The random access is specified in clause 6 of TS 36.213[3] and the control of the RACH transmission is specified in clause 5.1 of TS 36.321[17]. Contention based random access procedures can only be carried out on PCell and PSCell, while non-contention based random access procedures can be carried out on PCell, one or two activated SCell(s), and PSCell. For UEs supporting CA with FS3 SCells, the random access procedures can only be carried out on PCell.

## 6.2.2 Requirements

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula defined in TS 36.213[3] and apply this power level at the first preamble or additional preambles. The absolute power applied to the first preamble shall have an accuracy as specified in table 6.3.5.1.1-1 of TS 36.101[5]. The relative power applied to additional preambles shall have an accuracy as specified in table 6.3.5.2.1-1 of 36.101[5].

The UE shall indicate a Random Access problem to upper layers if the maximum number of preamble transmission counter has been reached for the random access procedure on PCell or PSCell as specified in clause 5.1.4 in TS 36.321 [17].

The UE shall stop preamble transmission if maximum number of preamble transmission counter has been reached for the random access procedure on an activated Scell as specified in clause 5.1.4 in TS 36.321 [17].

### 6.2.2.1 Contention based random access

#### 6.2.2.1.1 Correct behaviour when receiving Random Access Response reception

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

#### 6.2.2.1.2 Correct behaviour when not receiving Random Access Response reception

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window defined in clause 5.1.4 TS 36.321.

#### 6.2.2.1.3 Correct behaviour when receiving a NACK on msg3

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3.

#### 6.2.2.1.4 Void

#### 6.2.2.1.5 Correct behaviour when receiving a message over Temporary C-RNTI

The UE shall send ACK if the Contention Resolution is successful.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### 6.2.2.1.6 Correct behaviour when contention Resolution timer expires

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### 6.2.2.2 Non-Contention based random access

##### 6.2.2.2.1 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

The UE is not allowed to re-transmit the preamble on SCells without PUSCH on the SCCs to which SRS carrier based switching is performed, even if all received Random Access Responses contain Random Access Preamble identifiers do not match the transmitted Random Access Preamble, unless the UE receives the corresponding new PDCCH order.

##### 6.2.2.2.2 Correct behaviour when not receiving Random Access Response

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

The UE is not allowed to re-transmit the preamble on SCells without PUSCH on the SCCs to which SRS carrier based switching is performed, unless the UE receives the corresponding new PDCCH order.

### 6.2.3 Requirements for Cat-M1 UEs

In addition to the requirements defined in 6.2.1 and 6.2.2, a Cat-M1 UE shall also execute the random access procedure defined in clause 5.1 in TS 36.321 [17] using the PRACH configuration contained in *PRACH-ConfigSIB* in TS 36.331 [2]

- Determines the enhanced coverage level based on the RSRP measurement and the configured criterion (*RSRP-ThresholdsPrach* [2]) as defined in section 5.1.1, TS 36,321 [17],
- Selects PRACH resources [2] configured for the corresponding enhanced coverage level as determined in the previous step and;
- Transmits or re- transmits PRACH preamble using the selected PRACH resources and PRACH configuration.

## 6.3 RRC Connection Release with Redirection

### 6.3.1 Introduction

RRC connection release with redirection is initiated by the UE upon receiving the "*RRCConnectionRelease*" message from the E-UTRAN, TS 36.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 in TS 36.331 [2].

The requirements in this clause are applicable to both E-UTRAN FDD and TDD.

### 6.3.2 Requirements

#### 6.3.2.1 RRC connection release with redirection to UTRAN FDD

The UE shall be capable of performing the RRC connection release with redirection to the target UTRAN FDD cell within $T_{connection_release_redirect_UTRA\ FDD}$.

The time delay ($T_{connection_release_redirect_UTRA\ FDD}$) is the time between the end of the last TTI containing the RRC command, "*RRCConnectionRelease*" (TS 36.331 [2]) on the E-UTRAN PDSCH and the time the UE starts to send random access to the target UTRA FDD cell. The time delay ($T_{connection_release_redirect_UTRA\ FDD}$) shall be less than:

$$T_{connection_release_redirect_UTRA\ FDD} = T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ FDD} + T_{SI\text{-}UTRA\ FDD} + T_{RA}$$

The target UTRA FDD cell shall be considered detectable when:

- CPICH Ec/Io $\geq$ -15 dB,
- SCH_Ec/Io $\geq$ -15 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code.

$T_{RRC_procedure_delay}$: It is the RRC procedure for processing the received message "*RRCConnectionRelease*". It shall be less than 110 ms.

$T_{identify\text{-}UTRA\ FDD}$: It is the time to identify the target UTRA FDD cell. It shall be less than 500 ms.

$T_{SI\text{-}UTRA\ FDD}$: It is the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released.

$T_{RA}$: It is the delay caused due to the random access procedure when sending random access to the target UTRA FDD cell.

### 6.3.2.2 RRC connection release with redirection to GERAN

The UE shall be capable of performing the RRC connection release with redirection to the target GERAN cell within $T_{connection_release_redirect_GERAN}$.

The time delay ($T_{connection_release_redirect_GERAN}$) is the time between the end of the last TTI containing the RRC command, "*RRCConnectionRelease*" (TS 36.331 [2]) on the E-UTRAN PDSCH and the time the UE starts to send random access to the target GERAN cell. The time delay ($T_{connection_release_redirect_GERAN}$) shall be less than:

$$T_{connection_release_redirect_\ GERAN} = T_{RRC_procedure_delay} + T_{identify\text{-}GERAN} + T_{SI\text{-}GERAN} + T_{RA}$$

The target GERAN cell shall be considered detectable when the UE receives the GERAN cell at levels down to 10 dB + the reference sensitivity level or reference interference levels as specified in [9].

$T_{RRC_procedure_delay}$: It is the RRC procedure for processing the received message "*RRCConnectionRelease*". It shall be less than 110 ms.

$T_{identify\text{-}UTRA\ GERAN}$: It is the time to identify the BSIC of the target GERAN cell. It shall be less than 1 second.

$T_{SI\text{-}UTRA\ GERAN}$: It is the time required for acquiring all the relevant system information of the target GERAN cell. This time depends upon whether the UE is provided with the relevant system information of the target GERAN cell or not by the E-UTRAN before the RRC connection is released.

$T_{RA}$: It is the delay caused due to the random access procedure when sending random access burst to the target GERAN cell.

### 6.3.2.3 RRC connection release with redirection to UTRAN TDD

The UE shall be capable of performing the RRC connection release with redirection to the target UTRAN TDD cell within $T_{connection_release_redirect_UTRA\ TDD}$.

The time delay ($T_{connection_release_redirect_UTRA\ TDD}$) is the time between the end of the last TTI containing the RRC command, "*RRCConnectionRelease*" (TS 36.331 [2]) on the E-UTRAN PDSCH and the time the UE starts to send random access to the target UTRA TDD cell. The time delay ($T_{connection_release_redirect_UTRA\ TDD}$) shall be less than:

$$T_{connection_release_redirect_UTRA\ TDD} = T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ TDD} * N_{redirect\text{-}UTRA\ TDD} + T_{SI\text{-}UTRA\ TDD} + T_{RA}$$

The target UTRA TDD cell shall be considered detectable when:

- P-CCPCH Ec/Io $\geq$ -6 dB,
- DwPCH_Ec/Io $\geq$ -1 dB.

$T_{RRC_procedure_delay}$: It is the RRC procedure for processing the received message "*RRCConnectionRelease*". It shall be less than 110 ms.

$T_{identify\text{-}UTRA\ TDD}$: It is the time to identify the target UTRA TDD cell. It shall be less than 500 ms.

$T_{SI\text{-}UTRA\ TDD}$: It is the time required for acquiring all the relevant system information of the target UTRA TDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA TDD cell or not by the E-UTRAN before the RRC connection is released.

$T_{RA}$: It is the delay caused due to the random access procedure when sending random access to the target UTRA TDD cell.

$N_{redirect\text{-}UTRA\ TDD}$: It is the total number of target UTRA TDD frequencies included in RedirectedCarrierInfo in "*RRCConnectionRelease*" message. It can be up to 4 UTRA TDD frequencies.

### 6.3.2.4 RRC connection release with redirection to NR

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell within $T_{connection_release_redirect_NR}$.

The time delay ($T_{connection_release_redirect__NR}$) is the time between the end of the last TTI containing the RRC command, "*RRCConnectionRelease*" (TS 36.331 [2]) on the E-UTRAN PDSCH and the time the UE starts to send random access to the target NR cell. The time delay ($T_{connection_release_redirect_NR}$) shall be less than:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify\text{-}NR} + T_{SI\text{-}NR} + T_{RACH}$$

The target NR cell shall be considered detectable when for each relevant SSB:

- SSB_RP and SSB Ês/Iot according to Annex B.2.5 of TS 38.133 [50] for a corresponding NR Band.

$T_{RRC_procedure_delay}$: It is the RRC procedure delay for processing the received message "*RRCConnectionRelease*" as defined in clause 6.2.2 of TS 36.331 [2]. It shall be less than 110 ms.

$T_{identify\text{-}NR}$: It is the time to identify the target NR cell and depends on the frequency range (FR) of the target NR cell. It is defined in table 6.3.2.4-1. $T_{identify\text{-}NR} = T_{PSS/SSS\text{-}sync} + T_{meas}$, where$T_{PSS/SSS\text{-}sync}$ is the cell search time and $T_{meas}$ is the measurement time due to cell selection criteria evaluation.

$T_{SI\text{-}NR}$: It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

$T_{RACH}$: It is the delay caused due to the random access procedure when sending random access to the target NR cell. $T_{RACH}$ can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [39].

cell in the redirection command, otherwise $T_{rs}$ is the SMTC periodicity configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, $T_{rs}$ is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this section is applied with $T_{rs}$ = 20 ms assuming the SSB transmission periodicity is not larger than 20 ms,
- there is no requirement if the SSB transmission periodicity is larger than 20 ms.

**Table 6.3.2.4-1: Time to identify target NR cell for RRC connection release with redirection to NR**

| Frequency range (FR) of target NR cell | $T_{identify\text{-}NR}$ |
|---|---|
| FR1 | MAX (680 ms, 11 x Trs) |
| FR2 | MAX (880 ms, 88 x Trs) |

### 6.3.2.5 RRC connection release with redirection to NR carrier subject to CCA

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell subject to CCA within $T_{connection_release_redirect_NR_CCA}$.

The time delay ($T_{connection_release_redirect_NR_CCA}$) is the time between the end of the last TTI containing the RRC command, "*RRCConnectionRelease*" (TS 36.331 [2]) on the E-UTRAN PDSCH and the time the UE starts to send random access to the target NR cell. The time delay ($T_{connection_release_redirect_NR_CCA}$) shall be less than:

$$T_{connection_release_redirect_NR_CCA} = T_{RRC_procedure_delay} + T_{identify\text{-}NR_CCA} + T_{SI\text{-}NR_CCA} + T_{RACH_CCA}$$

The target NR cell shall be considered detetable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.5 of TS 38.133 [50] for a corresponding NR Band are fulfilled.

$T_{RRC_procedure_delay}$: It is the RRC procedure delay for processing the received message "*RRCConnectionRelease*" as defined in clause 6.2.2 of TS 36.331 [2].

$T_{identify\text{-}NR_CCA}$: It is the time to identify the target NR cell and is defined as:

- $T_{identify\text{-}NR_CCA} = T_{PSS/SSS\text{-}sync} + T_{meas}$; $T_{PSS/SSS\text{-}sync}$ is the cell search time and $T_{meas}$ is the measurement time due to cell selection criteria evaluation.

- $T_{identify\text{-}NR_CCA}$ = MAX (680 ms, $(L_1+11) \times T_{rs}$); where $L_1$ is the number of SMTC occasions not available at the UE due to DL CCA failures. If $L_1 > L_{1,max}$ then the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 36.304 [1]; where $L_{1,max}$ is defined in Table 6.3.2.5-1.

  In the requirements of clause 6.3.2.5, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period; otherwise the SMTC occasion is considered as available at the UE.

$T_{SI\text{-}NR_CCA}$: It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

$T_{RACH_CCA}$: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell:

- $T_{RACH_CCA} = (1+L_2) \times T_{SSB,RO} + 10$ ms; where:

  - $L_2$ is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. $L_2 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [57].

  - $T_{SSB,RO}$ is the SSB to PRACH occasion association period as defined in the table 8.1-1 of TS 38.213 [39].

  - The value of L2 is limited by *PREAMBLE_TRANSMISSION_COUNTER*, which is increased when PRACH occasion is unavailable for PRACH transmission due to UL CCA failure as specified in TS 38.321 [43]. The UE behaviour when *PREAMBLE_TRANSMISSION_COUNTER* reaches the *preambleTransMax* is specified in TS 38.321 [43].

    In the requirements of clause 6.3.2.5, the term PRACH occasion unavailable for transmission refers to when the PRACH occasion is configured by gNB at the UE but not transmitted by the UE during the corresponding period due to UL CCA failure at the UE.

$T_{rs}$ is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise $T_{rs}$ is the SMTC periodicity configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with $T_{rs}$ = 20 ms if the SSB transmission periodicity is not larger than 20 ms; otherwise,

- there is no requirement if the SSB transmission periodicity is larger than 20ms.

**Table 6.3.2.5-1: Maximum allowed number of missed SMTC occasions during cell identification**

| SMTC periodicity ($T_{rs}$) [ms] | Maximum allowed number of missed SMTC occasions ($L_{1,max}$) |
|---|---|
| $T_{rs} \leq 40$ | 8 |
| $T_{rs} > 40$ | 4 |

# 6.4 CSG Proximity Indication for E-UTRAN and UTRAN

## 6.4.1 Introduction

The requirements defined in this section are applicable to a UE supporting and configured with CSG proximity indication and are valid when a UE is entering the proximity of one or more CSG member cell(s) or leaving the proximity of all CSG member cell(s) on a UTRA or E-UTRA frequency as specified in [2].

The detection of CSG proximity is based on a UE autonomous search function.

## 6.4.2 Requirements

The UE shall initiate transmission of the ProximityIndication message with “entering” according to [2] within 6 minutes after entering the proximity of one or more CSG member cell(s) on a UTRA or E-UTRA frequency.

The UE shall initiate transmission of the ProximityIndication message with “leaving” according to [2] within 6 minutes after leaving the proximity of all CSG member cell(s) on a UTRA or E-UTRA frequency.

There is no need for statistical testing of this requirement.

NOTE: Entering the proximity of one or more CSG member cell(s) means that the UE is near a cell whose CSG ID is in the UE’s CSG whitelist (as determined based on autonomous search procedures). Leaving the proximity of one or more CSG member cell(s) means that the UE is no longer near any cell whose CSG ID is in the UE’s CSG whitelist.

# 6.5 RRC Re-establishment for NB-IoT UEs

## 6.5.1 Introduction

RRC connection re-establishment is initiated when a UE in RRC connected mode loses RRC connection due to any of these reasons: radio link failure or radio link problem. The RRC re-establishment procedure is specified in clause 5.3.7 in TS 36.331 [2].

## 6.5.2 Requirements

In RRC connected mode the UE shall be capable of sending *RRCConnectionReestablishmentRequest* message within $T_{re\text{-}establish_delay_NB\text{-}IoT}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re\text{-}establish_delay_NB\text{-}IoT}$) shall be less than:

$$T_{re\text{-}establish_delay_NB\text{-}IoT} = T_{UL_grant} + T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$$

$T_{UL_grant}$: It is the time required to acquire and process uplink grant from the target cell. The uplink grant is required to transmit *RRCConnectionReestablishmentRequest* message.

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$) is specified in clause 6.5.2.1 for a UE in normal coverage and in clause 6.5.2.2 for a UE in enhanced coverage.

These requirements are not applicable for UEs that only support the Control Plane CIoT EPS optimisation (see TS 24.301). Connection control in NB-IoT is defined in Clause 5.3.1.4 in TS 36.331 [2].

### 6.5.2.1 UE Re-establishment delay requirement in normal coverage

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 36.331 [2] is detected by the UE to the time when the UE sends PRACH preamble to the target cell. The UE re-establishment delay ($T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$) requirement shall be less than:

$$T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB1\text{-}NC} + T_{SI_NB1\text{-}NC} + T_{PRACH_NB\text{-}IoT}$$

$T_{search_NB1\text{-}NC}$: It is the time required by the UE to search the target cell:

If the target cell is known, then $T_{search_NB1\text{-}NC}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search_NB1\text{-}NC}$ = 80 ms. Otherwise, $T_{search_NB1\text{-}NC}$ = 1400 ms.

$T_{SI_NB1\text{-}NC}$: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for the target cell for a UE in normal coverage.

$T_{PRACH_NB\text{-}IoT}$: The additional delay caused by the random access procedure. The actual value of $T_{PRACH_NB\text{-}IoT}$ shall depend upon the NPRACH configuration used in the target cell and the number of repetition used by UE for sending random access to the target cell. There might be additional delay due to ramping procedure.

$N_{NB\text{-}Iot\text{-}freq}$: It is the total number of NB-IoT frequencies to be monitored for RRC re-establishment; $N_{NB\text{-}Iot\text{-}freq}$ = 1 if the target cell is known.

There is no requirement if the target cell does not contain the UE context.

#### 6.5.2.2 UE Re-establishment delay requirement in enhanced coverage

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 36.331 [2] is detected by the UE to the time when the UE sends PRACH preamble to the target cell. The UE re-establishment delay ($T_{UE_re\text{-}establish_delay_NB\text{-}IoT}$) requirement shall be less than:

$$T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB1\text{-}EC} + T_{SI_NB1\text{-}EC} + T_{PRACH_NB\text{-}IoT}$$

- $T_{search_NB1\text{-}EC}$: It is the time required by the UE to search the target cell:
  - If the target cell is known, then $T_{search_NB1\text{-}EC}$ = 0 ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search_NB1\text{-}EC}$ = 80 ms. Otherwise, $T_{search_NB1\text{-}EC}$ = 14800 ms.
- $T_{SI_NB1\text{-}EC}$: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for the target cell for a UE in enhanced coverage.
- $T_{PRACH_NB\text{-}IoT}$: The additional delay caused by the random access procedure. The actual value of $T_{PRACH_NB\text{-}IoT}$ shall depend upon the NPRACH configuration used in the target cell and the number of repetition used by UE for sending random access to the target cell. There might be additional delay due to ramping procedure.
- $N_{NB\text{-}Iot\text{-}freq}$: It is the total number of NB-IoT frequencies to be monitored for RRC re-establishment; $N_{NB\text{-}Iot\text{-}freq}$ = 1 if the target cell is known.

There is no requirement if the target cell does not contain the UE context.

## 6.6 Random Access for UE category NB1

### 6.6.1 Introduction

The random access procedure is used when establishing the layer 1 communication between the UE and NB-IoT. The random access is specified in clause 6 of TS 36.213[3] and the control of the RACH transmission is specified in clause 5.1 of TS 36.321[17]. The UE category NB1 supports only contention-based random access transmission on anchor carrier and on non-anchor carrier.

The requirements in this section are applicable for the random access transmission by the UE category NB1 to an anchor carrier or to a non-anchor carrier under the following conditions:

- The anchor and non-anchor carrier frequencies are within 20 MHz and
- The anchor and the non-anchor carrier frequencies are in the same base station or in co-located base stations.

### 6.6.2 Requirements

The UE shall have capability to calculate NPRACH transmission power according to the NPRACH power formula defined in TS 36.213[3] and apply this power level at the first preamble or additional preambles. The absolute power

applied to the first preamble shall have an accuracy as specified in TS 36.101[5]. The relative power applied to additional preambles shall have an accuracy as specified in 36.101[5].

The UE shall indicate a Random Access problem to upper layers if the maximum number of preamble transmission counter has been reached for the random access procedure on target cell as specified in clause 5.1.4 in TS 36.321 [17].

#### 6.6.2.1 Correct behaviour when receiving Random Access Response reception

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

#### 6.6.2.2 Correct behaviour when not receiving Random Access Response reception

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window defined in clause 5.1.4 TS 36.321.

#### 6.6.2.3 Correct behaviour when receiving a NACK on msg3

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3.

#### 6.6.2.4 Correct behaviour when receiving a message over Temporary C-RNTI

The UE shall send ACK if the Contention Resolution is successful.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### 6.6.2.5 Correct behaviour when contention Resolution timer expires

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### 6.6.2.6 MSG3-based channel quality report for UE Category NB1

The requirements in this clause shall apply for UE supporting DL channel quality reporting for UE Category NB1 as defined in TS 36.331 [2] section 5.3.3.3, 5.3.3.3a, and 5.3.7.4.

The DL channel quality provides the serving eNB with information about the minimum NPDCCH repetition level to satisfy the hypothetical NPDCCH block error rate of 1% with the parameters specified in Table 6.6.2.6-1.

**Table 6.6.2.6-1: NPDCCH transmission parameters for downlink quality reporting.**

| Parameters | Values |
|---|---|
| DCI format | Format N1 |
| Number of information bits (excluding CRC) | 23bits |
| System bandwidth | 200kHz |
| Aggregation level | 2 |
| DRX | OFF |

For channel quality reporting in the anchor carrier, the reported NPDCCH repetition level shall be derived from the channel quality measured in the period T1 or T2 in the carrier where the random access response is transmitted, where

- T1 is the period before NPRACH transmission used for NRSRP measurement for enhanced coverage level estimation
- T2 is the period from the beginning of the random access response to the beginning of PUSCH format 1 for DL channel quality reporting.

For channel quality reporting in the non-anchor carrier, the reported NPDCCH repetition level shall be derived from the channel quality measured in the period T2 in the carrier where UE monitors Random Access Response where T2 is defined above.

The NPDCCH repetition level for CQI-NPDCCH-NB and CQI-NPDCCH-Short-NB is chosen from the supported NPDCCH repetition levels [3]. The report mapping is defined in 9.1.22.15.

The UE shall satisfy the downlink channel quality measurement accuracy requirements as specified in 9.1.22.16.

### 6.6.3 Requirements for NPRACH configuration

In addition to the requirements defined in 6.6.2, UE shall also execute the random access procedure defined in clause 5.1 in TS 36.321 [17] using the NPRACH configuration contained in *NPRACH-ConfigSIB-NB* in TS 36.331 [2].

The UE shall apply the following procedure:

- Determines the enhanced coverage level based on the NRSRP intra-frequency measurement performed on the anchor carrier, for NPRACH transmission to the anchor carrier or for NPRACH transmission to the non-anchor carrier, and the configured criterion as defined in section 5.1.1, TS 36,321 [17],
- Selects NPRACH resources [2] configured for the corresponding enhanced coverage level as determined in the previous step and;
- Transmits or re-transmits NPRACH preamble using the selected NPRACH resources and NPRACH configuration.

## 6.7 RRC Re-establishment for Cat-M1 UEs

### 6.7.1 Introduction

RRC connection re-establishment is initiated when a Cat-M1 UE either configured with CEModeA or CEModeB in RRC connected mode looses RRC connection due to any of these reasons: radio link failure or radio link problem. The RRC re-establishment procedure is specified in clause 5.3.7 in TS 36.331 [2].

### 6.7.2 Requirements

In RRC connected mode the UE shall be capable of sending *RRCConnectionReestablishmentRequest* message within $T_{re\text{-}establish_delay}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re\text{-}establish_delay}$) shall be less than:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}$$

$T_{UL_grant}$: It is the time required to acquire and process uplink grant from the target cell. The uplink grant is required to transmit *RRCConnectionReestablishmentRequest* message.

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) is specified in clause 6.7.2.1 for a UE configured with CEModeA and in clause 6.7.2.2 for a UE configured with CEModeB.

#### 6.7.2.1 UE Re-establishment delay requirement for CEModeA

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 36.331 [2] is detected by the UE to the moment the UE has transmitted all repetitions of the PRACH preamble to the target cell. The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) requirement for a UE configured with CEModeA shall be less than:

$$T_{UE\text{-}re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * Tsearch + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA} + T_{PRACH}$$

- $T_{search}$ is the time required by the UE to search the target cell. $T_{search}$ =100 ms if the target cell is known by the UE. Otherwise, $T_{search}$ is specified in relevant intra-frequency cell identification requirements as described in Clause 8.13.2.1 for a UE configured with CEModeA. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

In the above requirement, a cell is known if it has been meeting the relevant cell identification requirement for a time duration equal to or longer than the time duration required for the cell identification. Otherwise, it is unknown.

- $T_{SI}$: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for the target cell for a UE configured with CEModeA. $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ includes the time to acquire the MIB and all the relevant SIBs of the target cell.

- $T_{PRACH}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the target cell. The actual value of $T_{PRACH}$ shall depend upon the PRACH configuration used in the target cell and the PRACH coverage enhancement level used by the UE for sending the random access to the target cell.

- $N_{freq}$: It is the total number of frequencies to be monitored for RRC re-establishment; $N_{freq} = 1$ if the target cell is known.

There is no requirement if the target cell does not contain the UE context.

#### 6.7.2.2 UE Re-establishment delay requirement for CEModeB

The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 36.331 [2] is detected by the UE to the moment the UE has transmitted all repetitions of PRACH preamble to the target cell. The UE re-establishment delay ($T_{UE_re\text{-}establish_delay}$) requirement for a UE configured with CEModeB shall be less than:

$$T_{UE\text{-}re\text{-}establish_delay} = 50\ ms + N_{freq} * Tsearch + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$$

- $T_{search}$ is the time required by the UE to search the target cell. $T_{search}$ =100 ms if the target cell is known by the UE. Otherwise, $T_{search}$ is specified in relevant intra-frequency cell identification requirements as described in Clause 8.13.3.1 for a UE configured with CEModeB. Regardless of whether DRX is in use by the UE, $T_{search}$ shall still be based on non-DRX target cell search times.

  In the above requirement, a cell is known if it has been meeting the relevant cell identification requirement for a time duration equal to or longer than the time duration required for the cell identification. Otherwise, it is unknown.

- $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [2] for the target cell for a UE configured with CEModeA; $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$ includes the time to acquire the MIB and all the relevant SIBs of the target cell.

- $T_{PRACH}$ is the interruption uncertainty in acquiring the first available PRACH occasion in the target cell. The actual value of $T_{PRACH}$ shall depend upon the PRACH configuration used in the target cell and the PRACH coverage enhancement level used by the UE for sending the random access to the target cell.

- $N_{freq}$: It is the total number of frequencies to be monitored for RRC re-establishment; $N_{freq} = 1$ if the target cell is known.

There is no requirement if the target cell does not contain the UE context.

## 6.8 RRC Connection Release with Redirection for Cat-M1 UEs

### 6.8.1 Introduction

RRC connection release with redirection is initiated by the UE upon receiving the "*RRCConnectionRelease*" message from the E-UTRAN, TS 36.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 in TS 36.331 [2].

The requirements in this clause are applicable for UE caterory M1 capable of E-UTRA FDD, TDD or HD-FDD operation.

## 6.8.2 Requirements

### 6.8.2.1 RRC connection release with redirection to E-UTRAN with CE Mode A

The UE shall be capable of performing the RRC connection release with redirection to the target E-UTRA cell within $T_{connection_release_redirect_E\text{-}UTRA\ cat\text{-}M1}$.

The time delay ($T_{connection_release_redirect_E\text{-}UTRA\ cat\text{-}M1}$) is the time between the end of the last subframe in the repetition period of PDSCH containing the IE, "*RRCConnectionRelease*" and the end of the last subframe in the repetition period of the PRACH transmission to the target E-UTRA cell. The time delay ($T_{connection_release_redirect_E\text{-}UTRA\ cat\text{-}M1}$) shall be less than:

$$T_{connection_release_redirect_E\text{-}UTRA\ cat\text{-}M1} = T_{RRC_procedure_delay} + T_{identify\text{-}E\text{-}UTRA\ cat\text{-}M1} + T_{SI\text{-}E\text{-}UTRA\ cat\text{-}M1} + T_{RA\ cat\text{-}M1}$$

The target E-UTRA FDD or TDD cell shall be considered detectable for a category M1 UE capable of E-UTRA FDD or TDD provided that:

- RSRP related side conditions given in Section 9.1.21.2 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band.

The target E-UTRA FDD cell shall be considered detectable for a category M1 UE capable of E-UTRA HD-FDD provided that:

- RSRP related side conditions given in Section 9.1.21.2 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band.

$T_{RRC_procedure_delay}$: It is the RRC procedure for processing the received message "*RRCConnectionRelease*". It shall be less than 110 ms.

$T_{identify\text{-}E\text{-}UTRA\ cat\text{-}M1}$: It is the time required to identify the target E-UTRA cell. It shall be less than 960 ms.

$T_{SI\text{-}E\text{-}UTRA\ cat\text{-}M1}$: It is the time required for acquiring all the relevant system information (SI) of the target E-UTRA cell. If old E-UTRA serving cell, before the release of the RRC connection, provides the UE with the SI (including MIB and all relevant SIBs) of the target E-UTRA cell, then $T_{SI\text{-}E\text{-}UTRA\ FDD} = 0$ ms. The value of $T_{SI\text{-}E\text{-}UTRA\ cat\text{-}M1}$ depends on the repetitions of PBCH and PDSCH used in the target cell.

$T_{RA\ cat\text{-}M1}$: It is the delay caused due to the random access procedure when sending random access to the target E-UTRA cell. The value of $T_{RA}$ depends on the PRACH configuration and the repetition used in the target cell.

# 6.9 RRC Connection Redirection to Non-anchor Carrier in NB-IoT

## 6.9.1 Introduction

RRC connection redirection to a non-anchor carrier is initiated by the UE upon receiving the IE, "*CarrierConfigDedicated-NB*", from the E-UTRAN, TS 36.331 [2]. The RRC redirection to procedure is specified in clause 6.7.3.2 in TS 36.331 [2].

The requirements in this section are applicable under the following conditions:

- The anchor and non-anchor carrier frequencies are within 20 MHz and
- The anchor and the non-anchor carrier frequencies are in the same base station or in co-located base stations.

## 6.9.2 Requirements

The UE shall be capable of performing the RRC connection redirection to the non-anchor carrier within $T_{connection_redirect_non\text{-}anchor}$.

The time delay ($T_{connection_redirect_non\text{-}anchor}$) is the time between the end of the last subframe in the repetition period of NPDSCH containing the IE, "*CarrierConfigDedicated-NB*" received on the anchor carrier and the end of the last

subframe in the repetition period of NPUSCH transmitted on the target non-anchor carrier. The time delay ($T_{connection_redirect_non\text{-}anchor}$) shall be less than:

$$T_{connection_redirect_non\text{-}anchor} = T_{RRC_procedure_delay} + T_{period_DL_bitmap} + T_{UL_grant} + T_{DL\text{-}UL\ switch} + T_{NPUSCH}$$

$T_{RRC_procedure_delay}$: It is the RRC procedure for processing the received message "*CarrierConfigDedicated-NB*". It shall be less than 110 ms.

$T_{period_DL_bitmap}$: It is the periodicity of the downlink subframe configuration for downlink transmission on the non-anchor carrier. It is configured via IE *DL-Bitmap-NB* [2] and can be 10 ms or 40 ms.

$T_{UL_grant}$: It is the time required to acquire uplink grant from the non-anchor carrier for transmitting NPUSCH on the non-anchor carrier. The value of $T_{UL_grant}$ depends on $T_{period_DL_bitmap}$ and the number of repetitions of NPDCCH used in the non-anchor carrier.

$T_{DL\text{-}UL\ switch}$: It is the time between the end of the last subframe in the repetition period of NPDCCH received on the non-anchor carrier and the start of the first subframe in the repetition period of the corresponding NPUSCH transmitted on the non-anchor carrier. $T_{DL\text{-}UL\ switch}$ is 8 ms.

$T_{NPUSCH}$: It is the time required to transmit NPUSCH on the non-anchor carrier. The value of $T_{NPUSCH}$ depends on the number of repetitions of NPUSCH used in the non-anchor carrier.

When the NPUSCH ACK transmission for the received RRC message takes longer than 110ms, the overall RRC connection redirection delay may be extended.

# 7 Timing and signalling characteristics

## 7.1 UE transmit timing

### 7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the connected eNode B. The uplink frame transmission takes place $(N_{TA} + N_{TAoffset}) \times T_s$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. The UE shall be configured with a pTAG containing the PCell. The pTAG may also contain up to six SCells, if configured. The UE capable of supporting multiple timing advances [2] may also be configured with one or two serving cells with uplink in one or two sTAG and pTAG.

The other downlink SCell(s), if configured, will be contained in either the pTAG or the sTAG(s). In pTAG, UE shall use the PCell as the reference cell for deriving the UE transmit timing for cells in the pTAG. When the UE capable of supporting multiple timing advance [2] is configured with one or two sTAG(s), the UE shall use an activated SCell from the sTAG for deriving the UE transmit timing for cells in the sTAG. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements. The requirements in clause 7 apply to all TAGs.

The UE capable of supporting dual connectivity shall be configured with one pTAG and may also be configured with one psTAG. The pTAG shall contain the PCell and may also contain one SCell, if configured. The psTAG shall contain the PSCell and may also contain one SCell, if configured. In pTAG, UE shall use the PCell as the reference cell for deriving the UE transmit timing for pTAG, and in psTAG, UE shall use the PSCell as the reference cell for deriving the UE transmit timing for psTAG. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements. The requirements in clause 7 apply to both TAGs.

The UE supporting carrier aggregation with FS3 SCells shall be configured with one pTAG and may also be configured with one sTAG. The pTAG shall contain the PCell and may also contain up to six FS3 or non-FS3 SCells. In pTAG, UE shall use the PCell as the reference cell for deriving the UE transmit timing for the cells in the pTAG. When the UE capable of supporting multiple timing advance [2] is configured with an sTAG, the sTAG shall contain at least one non-FS3 SCell and the UE shall use an activated non-FS3 SCell for deriving the UE transmit timing for cells in the sTAG. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements. The requirements in clause 7 apply to all TAGs.

## 7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 7.1.2-1. This requirement applies when it is the first transmission in a DRX, eDRX_CONN cycle for PUCCH, SPUCCH, PUSCH of subframe, slot or subslot duration and SRS, or it is the first transmission after RACH-less handover, or it is the PRACH transmission. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus $(N_{TA_Ref} + N_{TA\ offset}) \times T_s$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the reference cell. $N_{TA_Ref}$ for PRACH is defined as 0. $(N_{TA_Ref} + N_{TA\ offset})$ (in $T_s$ units) for other channels is the difference between UE transmission timing and the Downlink timing immediately after when the last timing advance in clause 7.3 was applied. $N_{TA_Ref}$ for other channels is not changed until next timing advance is received.

**Table 7.1.2-1: $T_e$ Timing Error Limit**

| Downlink Bandwidth (MHz) | $T_e$ |
|---|---|
| 1.4 | $24*T_S$ |
| ≥3 | $12*T_S$ |
| Note: $T_S$ is the basic timing unit defined in TS 36.211 | |

When it is not the first transmission in a DRX or eDRX_CONN cycle or there is no DRX or no eDRX_CONN cycle, and when it is the transmission for PUCCH, SPUCCH, PUSCH of subframe, slot or subslot duration and SRS transmission or it is not the first transmission after RACH-less handover, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell except when the timing advance in clause 7.3 is applied.

When in a TAG the transmission timing error between the UE and the reference timing exceeds $\pm T_e$, or in a sTAG the UE changes the downlink SCell for deriving the UE transmit timing for cells in the sTAG configured with one or two uplinks, the UE is required to adjust its timing to within $\pm T_e$ in that TAG, as long as,

- the UE is configured with a pTAG and one or two sTAG, the transmission timing difference between TAGs does not exceed the maximum transmission timing difference (i.e., 32.47us) after such adjustment, or
- the UE is configured with synchronous dual connectivity, the transmission timing difference between pTAG and psTAG does not exceed the maximum transmission timing difference (i.e., 35.21us) after such adjustment.

If the transmission timing difference after such adjustment is bigger than the maximum transmission timing difference UE may stop adjustment in this TAG. For a UE configured with more than one serving cell and with *ShortTTI -r15* or with *ShortProcessingTime=TRUE*, UE may stop the transmit timing adjustment if the conditions specified in the subclause B.7.1 cannot be fulfilled after such adjustment. The reference timing shall be $(N_{TA_Ref} + N_{TA\ offset}) \times T_s$ before the downlink timing of the reference cell. All adjustments made to the UE uplink timing under the above mentioned scenarios shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be $T_q$ seconds.
2) The minimum aggregate adjustment rate shall be $7*T_S$ per second.
3) The maximum aggregate adjustment rate shall be $T_q$ per 200ms.

If the UE is not configured with *highSpeedEnhMeasFlag2-r16* then the maximum autonomous time adjustment step $T_q$ is specified in Table 7.1.2-2.

If the UE is configured with *highSpeedEnhMeasFlag2-r16* then the maximum autonomous time adjustment step $T_q$ is specified in Table 7.1.2-3. The requirements in Table 7.1.2-3 shall apply provided that the UE is configured with only PCell.

**Table 7.1.2-2: $T_q$ Maximum Autonomous Time Adjustment Step when the UE is not configured with *highSpeedEnhMeasFlag2-r16***

| Downlink Bandwidth (MHz) | $T_q$ |
|---|---|
| 1.4 | $17.5*T_S$ |
| 3 | $9.5*T_S$ |
| 5 | $5.5*T_S$ |
| ≥10 | $3.5*T_S$ |

| Note: $T_S$ is the basic timing unit defined in TS 36.211 |
|---|

**Table 7.1.2-3: $T_q$ Maximum Autonomous Time Adjustment Step when the UE is configured with *highSpeedEnhMeasFlag2-r16***

| Downlink Bandwidth (MHz) | $T_q$ |
|---|---|
| 1.4 | $17.5*T_S$ |
| 3 | $9.5*T_S$ |
| ≥ 5 | $5.5*T_S$ |
| Note: $T_S$ is the basic timing unit defined in TS 36.211 | |

# 7.2 UE timer accuracy

## 7.2.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

## 7.2.2 Requirements

For UE timers specified in TS 36.331 [2], UE shall comply with the timer accuracies according to Table 7.2.2-1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. TTI alignment when UE sends messages at timer expiry).

**Table 7.2.2-1**

| Timer value [s] | Accuracy |
|---|---|
| timer value < 4 | ± 0.1s |
| timer value ≥ 4 | ± 2.5% |

# 7.3 Timing Advance

## 7.3.1 Introduction

The timing advance is initiated from E-UTRAN with MAC message that implies and adjustment of the timing advance, see TS 36.321 [17] clause 5.2.

## 7.3.2 Requirements

### 7.3.2.1 Timing Advance adjustment delay

When *ShortTTI-r15* is not configured and *ShortProcessingTime=FALSE*, the UE shall adjust the timing of its uplink transmission timing at sub-frame *n*+6 for a timing advance command received in sub-frame *n*.

When *ShortTTI-r15* is configured or *ShortProcessingTime=TRUE* and the TA command is received at subframe /slot/ subslot *n*, the timing advance adjustment delay is shown in Table 7.3.2.1-1. The UE shall adjust the uplink timing at the first subframe boundary following the time shown in Table 7.3.2.1-1.

The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

**Table 7.3.2.1-1: Timing advance adjustment delay requirement for sTTI and for *ShortProcessingTime=TRUE [2]***

| TTI duration | Processing time | Requirement to update timing | Units |
|---|---|---|---|
| *ShortTTI*-r15 not configured Note 1 | *ShortProcessingTime=TRUE* | n+5 | Subframe |
| *dl-STTI-Length-r15*=slot Note 1 | N/A | n+8 | Slot |
| *dl-STTI-Length-r15*=subslot Note 1 | *proc-Timeline-r15*= nplus4set1 | n+16 | Subslot |
| *dl-STTI-Length-r15*=subslot Note 1 | *proc-Timeline-r15*= nplus6set1 or *proc-Timeline-r15*= nplus6set2 | n+18 | Subslot |
| *dl-STTI-Length-r15*=subslot Note 1 | *proc-Timeline-r15*= nplus8set2 | n+20 | Subslot |
| Note 1: If the PDSCH HARQ processing time is modified by RRC signalling during an ongoing connection, the requirement to update timing is not defined from the time when the RRC command is received by the UE until the UE has applied the updated PDSCH HARQ processing time | | | |

### 7.3.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to $\pm 4 * T_S$ seconds to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command is expressed in multiples of $16 * T_S$ and is relative to the current uplink timing.

## 7.4 Cell phase synchronization accuracy (TDD)

### 7.4.1 Definition

Cell phase synchronization accuracy is defined as the maximum absolute deviation in frame start timing between any pair of cells on the same frequency that have overlapping coverage areas.

### 7.4.2 Minimum requirements

For Wide Area BS, the cell phase synchronization accuracy measured at BS antenna connectors shall be better than the requirement specified in table 7.4.2-1. If a cell's coverage area overlaps with another cell with different cell radius then the cell phase synchronization accuracy corresponding to the larger of the two cell sizes applies to the overlapping cells with different radii.

**Table 7.4.2-1 Cell phase synchronization requirement for wide area BS (TDD)**

| Cell Type | Cell Radius | Requirement |
|---|---|---|
| Small cell | ≤ 3 km | ≤ 3 μs |
| Large cell | > 3 km | ≤ 10 μs |

For Home BS, the cell phase synchronization accuracy measured at BS antenna connectors shall be better than the requirement specified in table 7.4.2-2.

**Table 7.4.2-2 Cell phase synchronization requirement for Home BS (TDD)**

| Source Cell Type | Propagation Distance | Requirement |
|---|---|---|
| Small cell | ≤ 500 m | ≤ 3 μs |
| Large cell | > 500 m | ≤1.33 + $T_{propagation}$ μs |

Note 1: $T_{propagation}$ is the propagation delay between the Home BS and the cell selected as the network listening synchronization source. In terms of the network listening synchronization source selection, the best accurate synchronization source to GNSS should be selected.

Note 2: If the Home BS obtains synchronization without using network listening, the small cell requirement applies.

# 7.5 Synchronization Requirements for E-UTRAN to 1xRTT and HRPD Handovers

## 7.5.1 Introduction

This clause contains the synchronization requirements for eNodeB capable of supporting E-UTRAN to CDMA 1xRTT and HRPD handovers. To facilitate E-UTRAN to CDMA 1xRTT and HRPD handovers, the CDMA System Time reference needs to be provided to the UE in order for the UE to report the pilot PN phases of the target 1xRTT or HRPD cells. This is achieved through the SIB8 message broadcasted by the serving eNodeB:

> If the eNodeB is synchronized to the GPS time and the LTE system frame is aligned with the start of CDMA System Time, then the size of CDMA System Time information is 39 bits and the unit is 10 ms based on a 1.2288 Mcps chip rate.
>
> If the eNodeB is not synchronized to the GPS time or if the eNodeB is synchronized to the GPS time but its LTE system frame not aligned with the start of CDMA System time, then the size of CDMA System Time information is 49 bits and the unit is 8 CDMA chips based on 1.2288 Mcps chip rate.

The CDMA system time reference provided by the serving eNodeB has to be within a certain level of accuracy in order to facilitate accurate reporting of the pilot PN phases of the target 1xRTT or HRPD cells and enable reliable handover to the 1xRTT or HRPD networks.

## 7.5.2 eNodeB Synchronization Requirements

### 7.5.2.1 Synchronized E-UTRAN

The eNodeB shall be synchronized to the GPS time. With external source of CDMA System Time disconnected, the eNodeB shall maintain the timing accuracy within ±10 μs of CDMA System Time for a period of not less than 8 hours.

The timing deviation between the SFN boundary at or immediately after the ending boundary of the SI-window in which *SystemInformationBlockType8* is transmitted and the broadcasted CDMA System Time shall be within 10 μs.

### 7.5.2.2 Non-Synchronized E-UTRAN

The timing deviation between the SFN boundary at or immediately after the end of the boundary of the SI-window in which *SystemInformationBlockType8* is transmitted and the broadcasted CDMA System Time shall be within 10 μs. With external source of CDMA System Time disconnected the SFN boundary at or immediately after the broadcasted CDMA System Time in the SIB8 message shall maintain the timing accuracy within ±10 μs of CDMA System Time for a period of not less than 8 hours.

# 7.6 Radio Link Monitoring

## 7.6.1 Introduction

The UE shall meet the radio link monitoring requirements specified for PSCell in section 7.6 provided that the UE is configured with the parameters T313, N313 and N314 defined in [2].

The UE shall monitor the downlink link quality based on the cell-specific reference signal in order to detect the downlink radio link quality of the PCell and PSCell as specified in [3].

The UE shall estimate the downlink radio link quality and compare it to the thresholds $Q_{out}$ and $Q_{in}$ for the purpose of monitoring downlink radio link quality of the PCell and PSCell.

The threshold $Q_{out}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical PDCCH transmission taking into account the PCFICH errors with transmission parameters specified in Table 7.6.1-1.

The threshold $Q_{in}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out}$ and shall correspond to 2% block error rate of a hypothetical PDCCH transmission taking into account the PCFICH errors with transmission parameters specified in Table 7.6.1-2.

When higher-layer signalling indicates certain subframes for restricted radio link monitoring, the radio link quality shall be monitored as specified in [3].

The requirements in sections 7.6.2.1, 7.6.2.2 and 7.6.2.3 shall also apply when a time domain measurement resource restriction pattern for performing radio link monitoring measurements is configured by higher layers (TS 36.331 [2]), with or without CRS assistance information, provided that also the following additional condition is fulfilled:

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the radio link monitoring measurements,

When the CRS assistance information is provided, the transmission bandwidth [30] in all intra-frequency cells in the CRS assistance information [2] is the same or larger than the transmission bandwidth of the PCell for which radio link monitoring is performed.

When the CRS assistance information is provided, the requirements in Section 7.6 shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the cell for which radio link monitoring is performed.

NOTE: If the UE is not provided with the CRS assistance information (TS 36.331 [2]) or the CRS assistance data is not valid throughout the entire evaluation period, then similar Release 8 and 9 requirements apply for time domain measurements restriction under colliding CRS with ABS configured in non-MBSFN subframes.

The UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for transmitting SRS and/or RACH over one or more SCells without PUSCH shall perform radio link monitoring and meet the requirements defined in Section 7.6 provided the following condition is met:

- at least one downlink subframe is available for doing radio link monitoring at the UE in the PCell;
- at least one downlink subframe is available for doing radio link monitoring at the UE in the PSCell if the UE is configured with PSCell.

**Table 7.6.1-1 PDCCH/PCFICH transmission parameters for out-of-sync**

| Attribute | Value |
|---|---|
| DCI format | 1A |
| Number of control OFDM symbols | 2; Bandwidth ≥ 10 MHz<br>3; 3 MHz ≤ Bandwidth ≤ 10 MHz<br>4; Bandwidth = 1.4 MHz |
| Aggregation level (CCE) | 4; Bandwidth = 1.4 MHz<br>8; Bandwidth ≥ 3 MHz |
| Ratio of PDCCH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell or PSCell.<br>1 dB; when two or four antenna ports are used for cell-specific reference signal transmission by the PCell or PSCell. |
| Ratio of PCFICH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell or PSCell.<br>1 dB; when two or four antenna ports are used for cell-specific reference signal transmission by the PCell or PSCell. |
| Note 1: DCI format 1A is defined in clause 5.3.3.1.3 in TS 36.212 [21].<br>Note 2: A hypothetical PCFICH transmission corresponding to the number of control symbols shall be assumed. | |

**Table 7.6.1-2 PDCCH/PCFICH transmission parameters for in-sync**

| Attribute | Value |
|---|---|
| DCI format | 1C |
| Number of control OFDM symbols | 2; Bandwidth ≥ 10 MHz<br>3; 3 MHz ≤ Bandwidth ≤ 10 MHz<br>4; Bandwidth = 1.4 MHz |

| | |
|---|---|
| Aggregation level (CCE) | 4 |
| Ratio of PDCCH RE energy to average RS RE energy | 0 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell or PSCell.<br>-3 dB; when two or four antenna ports are used for cell-specific reference signal transmission by the PCell or PSCell. |
| Ratio of PCFICH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell or PSCell.<br>1 dB; when two or four antenna ports are used for cell-specific reference signal transmission by the PCell or PSCell. |
| Note 1: DCI format 1C is defined in clause 5.3.3.1.4 in TS 36.212 [21].<br>Note 2: A hypothetical PCFICH transmission corresponding to the number of control symbols shall be assumed. | |

## 7.6.2 Requirements

### 7.6.2.1 Minimum requirement when no DRX is used

When the downlink radio link quality of the PCell or PSCell estimated over the last 200 ms period becomes worse than the threshold $Q_{out}$, Layer 1 of the UE shall send an out-of-sync indication for the PCell or PSCell to the higher layers within 200 ms $Q_{out}$ evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell or PSCell estimated over the last 100 ms period becomes better than the threshold $Q_{in}$, Layer 1 of the UE shall send an in-sync indication for the PCell or PSCell to the higher layers within 100 ms $Q_{in}$ evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

When the UE creates autonomous gaps for identification the CGI of an E-UTRA intra-frequency cell or an E-UTRA inter-frequency cell and when higher-layer signalling indicates certain subframes for restricted radio link monitoring, the UE shall also perform radio link monitoring. In this case, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out}}$) is 200 ms, and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in}}$) is 100 ms [Note 1].

Note 1: This RLM requirement does not need to be tested.

The out-of-sync and in-sync evaluations of the PCell or PSCell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least 10 ms.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer and the transmitter power of PSCell if configured shall be turned off within 40 ms after expiry of T313 timer as specified in clause 5.3.11 in TS 36.331 [2]. The UE shall not perform LBT procedure on any of FS3 SCell after the expiry of T310.

### 7.6.2.2 Minimum requirement when DRX is used

When DRX is used the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX}}$) specified in Table 7.6.2.2-1 will be used.

When higher-layer signalling indicates certain subframes for restricted radio link monitoring, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX}}$) specified in Table 7.6.2.2-2 will be used.

When eDRX_CONN cycle is used, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX}}$) specified in Table 7.6.2.2-3 will be used.

When the UE creates autonomous gaps for identification the CGI of an E-UTRA intra-frequency cell or an E-UTRA inter-frequency cell and when higher-layer signalling indicates certain subframes for restricted radio link monitoring, the UE shall also perform radio link monitoring. In this case, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX}}$) specified in Table 7.6.2.2-2 will be used [Note 1].

Note 1: This RLM requirement does not need to be tested.

When the downlink radio link quality of the PCell or PSCell estimated over the last $T_{Evaluate_Q_{out_DRX}}$ [s] period becomes worse than the threshold $Q_{out}$, Layer 1 of the UE shall send out-of-sync indication for the PCell or PSCell to the higher

layers within $T_{Evaluate_Q_{out_DRX}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell or PSCell estimated over the last $T_{Evaluate_Q_{in_DRX}}$ [s] period becomes better than the threshold $Q_{in}$, Layer 1 of the UE shall send in-sync indications for the PCell or PSCell to the higher layers within $T_{Evaluate_Q_{in_DRX}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell or PSCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, DRX_cycle_length). When the UE is configured with dual connectivity, then two successive indications from Layer 1 shall be separated by at least max(10 ms, MCG_DRX_cycle_length) for PCell and by at least max(10 ms, SCG_DRX_cycle_length) for PSCell. When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, eDRX_CONN cycle length).

Upon start of T310 timer or T313 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link of PCell or PSCell for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer or T313 timer. While the T310 or T313 timer is running, the UE capable of supporting network-based CRS interference mitigation can assume that the inactive time periods T2 specified in Section 3.6.1.1 for network-based CRS interference mitigation are not configured, regardless of the most recent DRX configuration.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer and the transmitter power of PSCell if configured shall be turned off within 40 ms after expiry of T313 timer as specified in clause 5.3.11 in TS 36.331 [2]. The UE shall not perform LBT procedure on any of FS3 SCells after the expiry of T310.

**Table 7.6.2.2-1: $Q_{out}$ and $Q_{in}$ Evaluation Period in DRX**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX}}$ and $T_{Evaluate_Q_{in_DRX}}$ (s) Note 1 |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.6.2.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | 20 * $T_{DRX}$ |
| 0.04 < DRX cycle ≤ 0. 64 | 10 * $T_{DRX}$ |
| 0.64 < DRX cycle ≤ 2.56 | 5 * $T_{DRX}$ |
| Note 1: Evaluation period length in time depends on the length of the DRX cycle in use. $T_{DRX}$ is the DRX cycle length.<br>Note 2: MCG's DRX configuration is applied for PCell RLM evaluation and SCG's DRX configuration is applied for PSCell RLM evaluation | |

**Table 7.6.2.2-2: $Q_{out}$ and $Q_{in}$ Evaluation Period in DRX when higher-layer signalling restricted measurement resource**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX}}$ and $T_{Evaluate_Q_{in_DRX}}$ (s) Note 1 |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.6.2.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | 40 * $T_{DRX}$ |
| 0.04 < DRX cycle ≤ 0. 16 | 20 * $T_{DRX}$ |
| 0. 16 < DRX cycle ≤ 0.64 | 10 * $T_{DRX}$ |
| 0.64 < DRX cycle ≤ 2.56 | 5 * $T_{DRX}$ |
| Note 1: Evaluation period length in time depends on the length of the DRX cycle in use. $T_{DRX}$ is the DRX cycle length.<br>Note 2: MCG's DRX configuration is applied for PCell RLM evaluation and SCG's DRX configuration is applied for PSCell RLM evaluation | |

**Table 7.6.2.2-3: $Q_{out}$ and $Q_{in}$ Evaluation Period when eDRX_CONN cycle is configured**

| eDRX_CONN cycle length [s] | $T_{Evaluate_Q_{out_DRX}}$ and $T_{Evaluate_Q_{in_DRX}}$ [s] Note |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | 5 * $T_{eDRX_CONN}$ |

| Note: | Evaluation period length in time depends on the length of the eDRX_CONN cycle in use. $T_{eDRX_CONN}$ is the eDRX_CONN cycle length. |
|---|---|

### 7.6.2.3 Minimum requirement at transitions

When the UE transitions between any two of DRX, eDRX_CONN and non-DRX or when DRX or eDRX_CONN cycle periodicity changes, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the PCell and PSCell.

### 7.6.2.4 Minimum requirement during SI Acquisition with autonomous gaps

For E-UTRAN FDD-UTRAN FDD measurements with autonomous gaps, for identification of the CGI of a UTRA FDD cell (clause 8.1.2.4.17), the UE shall also perform radio link monitoring. In this case the out-of sync and in-sync evaluation periods can be longer than those defined in sections 7.6.2.1-7.6.2.3.

For E-UTRAN TDD-UTRAN FDD measurements with autonomous gaps, for identification of the CGI of a UTRA FDD cell (clause 8.1.2.4.18), the UE shall also perform radio link monitoring. In this case the out-of sync and in-sync evaluation periods can be longer than those defined in sections 7.6.2.1-7.6.2.3.

For E-UTRAN FDD-NR measurements with autonomous gaps, for identification of the CGI of an NR cell (clause 8.1.2.4.27), the UE shall also perform radio link monitoring. In this case the out-of sync and in-sync evaluation periods can be longer than those defined in sections 7.6.2.1-7.6.2.3.

For E-UTRAN TDD-NR measurements with autonomous gaps, for identification of the CGI of an NR cell (clause 8.1.2.4.28), the UE shall also perform radio link monitoring. In this case the out-of sync and in-sync evaluation periods can be longer than those defined in sections 7.6.2.1-7.6.2.3.

### 7.6.2.5 Minimum requirement under IDC Interference

When the UE is provided with IDC solution, the UE shall also perform radio link monitoring and meet the corresponding requirements in clause 7.6.2.

## 7.7 SCell Activation and Deactivation Delay for E-UTRA Carrier Aggregation

### 7.7.1 Introduction

This section defines requirements for the delay within which the UE shall be able to activate a deactivated or dormant SCell, deactivate an activated or dormant SCell, or hibernate a deactivated or activated SCell in E-UTRA carrier aggregation. The requirements are applicable to an E-UTRA carrier aggregation capable UE which has been configured with up to six downlink SCells.

This section also defines requirements for the delay within which the UE shall be able to directly activate or directly hibernate a SCell in E-UTRA carrier aggregation. The requirements for dormant SCell are applicable for up to 4 SCell(s).

If multiple downlink SCells are activated or deactivated in the same MAC control element as defined in [17], the requirements shall apply to each of the SCells in the MAC control element.

For UE configured with one or more FeMBMS/Unicast-mixed SCells, the requirements in Section 7.7 apply also when one or more FeMBMS/Unicast-mixed SCells are activated or deactivated.

### 7.7.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this section shall apply for the UE configured with one downlink SCell. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation. The requirements in this clause are also applicable for EN-DC. The requirements in this clause are also applicable for the UE operating in NE-DC.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command as specified in [17] for the SCell being activated no later than in subframe $n+N_{act_known}$ provided the following conditions are met for the SCell:

- During the period equal to max(5 measCycleSCell, 5 DRX cycles) before the reception of the SCell activation command:
  - the UE has sent a valid measurement report for the SCell being activated and
  - the SCell being activated remains detectable according to the cell identification conditions specified in section 8.3.3.2,
- SCell being activated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2 where

$N_{act_known}$ =24;

$N_{act_known}$ =23 if the activation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{act_known}$ =22 if the activation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

Otherwise upon receiving the SCell activation command in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command as specified in [17] for the SCell being activated no later than in subframe $n+N_{act_unknown}$ provided the SCell can be successfully detected on the first attempt where

$N_{act_unknown}$ =34;

$N_{act_unknown}$ =33 if the activation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{act_unknown}$ =32 if the activation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

If there is no reference signal received for the CSI measurement over the delay corresponding to the minimum requirements specified above, then the UE shall report corresponding valid CSI for the activated SCell on the next available uplink reporting resource after receiving the reference signal.

The SCell activation delay specified in this section can be extended with each SRS carrier based switching to any carrier occuring during the SCell activation procedure.

If there are no uplink resources for reporting the valid CSI in subframe $n+N_{act_known}$ or $n+N_{act_unknown}$ or uplink transmission is interrupted due to SRS carrier based switching then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

The valid CSI is based on the UE measurement and corresponds to any CQI value specified in [3] with the exception of CQI index = 0 (out of range) provided:

- the conditions in section 7.7 are met over the entire SCell activation delay and
- the conditions for CQI reporting defined in Section 7.2.3 of [3] are met.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
- not occur before subframe *n+4* and not occur after subframe *n+8* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

- not occur before subframe *n+2* and not occur after subframe *n+6* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+10* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

When the UE operating in EN-DC is configured with NR PSCell and NR SCell in SCG, the interruption requirements defined above apply for PCell interruptions specified in clause 7.32.2.5 and NR PSCell and NR SCell interruptions specified in clause 8.2.1.4.2 of TS 38.133 [50].

When the UE is operating in NE-DC and has PSCell and up to one SCell configured in SCG, the interruption requirements defined above apply for PSCell interruptions specified in clause 7.36 and NR PCell and NR SCell interruptions specified TS 38.133 [50].

Starting from the subframe specified in section 4.3 of [3] and until the UE has completed the SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCell.

### 7.7.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this section shall apply for the UE configured with one downlink SCell. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation. The requirements in this clause are also applicable for EN-DC. The requirements in this clause are also applicable for the UE operating in NE-DC.

Upon receiving SCell deactivation command or upon expiry of the *sCellDeactivationTimer* in subframe *n*, the UE shall accomplish the deactivation actions specified in [17] for the SCell being deactivated no later than in subframe $n+N_{deact}$ where

$N_{deact}$ =8

$N_{deact}$ =7 if the deactivation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{deact}$ =6 if the deactivation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

The SCell deactivation delay specified in this section can be extended with each SRS carrier based switching to any carrier occuring during the SCell deactivation procedure.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+8* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

- not occur before subframe *n+2* and not occur after subframe *n+6* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
- not occur before subframe *n+4* and not occur after subframe *n+10* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

When the UE operating in EN-DC is configured with NR PSCell and NR SCell in SCG, the interruption requirements defined above apply for PCell interruptions specified in clause 7.32.2.5 and NR PSCell and NR SCell interruptions specified in clause 8.2.1.2.4 of TS 38.133 [50].

When the UE is operating in NE-DC and has PSCell and up to one SCell configured in SCG, the interruption requirements defined above apply for PSCell interruptions specified in clause 7.36 and NR PCell and NR SCell interruptions specified in TS 38.133 [50].

## 7.7.4 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells

The requirements in this section shall apply for the UE configured with up to six downlink SCells. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation. The requirements in this clause are also applicable for EN-DC. The requirements in this clause are also applicable for the UE operating in NE-DC.

While activating a SCell if the UE does not receive any command to activate, deactivate, configure or deconfigure any other SCell during the SCell activation delay then the UE shall meet the SCell activation delay requirements specified in section 7.7.2.

While activating a SCell if any other SCell is activated, deactivated, configured or deconfigured by the UE then the UE shall meet the SCell activation delay requirements ($T_{activate_total}$) according to the following expression:

$$T_{activate_total} = T_{activate_basic} + 5 \times \sum_{i=1}^{N-1} K_i$$

Where:

$T_{activate_total}$ is the total time to activate a SCell and is expressed in subframes.

$T_{activate_basic}$ is the SCell activation delay specified in section 7.7.2;

$K_i$ ($0 \leq K_i \leq 3$) is the number of times the other $i^{th}$ SCell is activated, deactivated, configured or deconfigured while the SCell is being activated.

N ($2 \leq N \leq 6$) is the maximum number of SCells supported by the UE.

While activating an SCell:

- The interruption on the PCell and/or on the activated SCell due to the SCell activation specified in section 7.8.2 shall
  - not occur before subframe *n+5* and not occur after subframe *n+11* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
  - not occur before subframe *n+4* and not occur after subframe *n+10* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
  - not occur before subframe *n+3* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

if:

- the PCell and/or the activated SCell being interrupted and the SCell being activated belong to E-UTRA TDD, or

- the activated SCell being interrupted and the SCell being activated belong to E-UTRA FDD and the PCell belongs to E-UTRA TDD.

- Otherwise, the interruption on PCell and/or on the activated SCell due to the SCell activation specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+8* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

  - not occur before subframe *n+2* and not occur after subframe *n+6* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2.

When the UE operating in EN-DC is configured with NR PSCell and NR SCell in SCG, the interruption requirements defined above apply for PCell and SCell interruptions specified in clause 7.32.2.5 and NR PSCell and NR SCell interruptions specified in clause 8.2.1.2.4 of TS 38.133 [50].

When the UE is operating in NE-DC and has PSCell and up to one SCell configured in SCG, the interruption requirements defined above apply for PSCell and SCell interruptions specified in clause 7.36 and NR PCell and NR SCell interruptions specified in TS 38.133 [50].

Starting from the subframe specified in section 4.3 of [3] and until the UE has completed the SCell activation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for an SCell.

## 7.7.5 SCell Deactivation Delay Requirement for Activated SCell with Multiple Downlink SCells

The requirements in this section shall apply for the UE configured with up to six downlink SCells. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation. The requirements in this clause are also applicable for EN-DC. The requirements in this clause are also applicable for the UE operating in NE-DC.

The UE shall deactivate a SCell and meet the SCell deactivation delay requirements specified in section 7.7.3 regardless of whether any other SCell is activated, deactivated, configured or deconfigured or not by the UE during the SCell deactivation delay.

While deactivating a SCell:

- The interruption on the PCell and/or on the activated SCell due to the SCell deactivation specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+11* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+10* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

if:

- the PCell and/or the activated SCell being interrupted and the SCell being deactivated belong to E-UTRA TDD or

- the activated SCell being interrupted and the SCell being deactivated belong to E-UTRA FDD and the PCell belongs to E-UTRA TDD.

- Otherwise, the interruption on PCell and/or the activated SCell due to the SCell deactivation specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+8* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

  - not occur before subframe *n+2* and not occur after subframe *n+6* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2.

When the UE operating in EN-DC is configured with NR PSCell and NR SCell in SCG, the interruption requirements defined above apply for PCell and SCell interruptions specified in clause 7.32.2.5 and NR PSCell and NR SCell interruptions specified in clause 8.2.1.2.4 of TS 38.133 [50].

When the UE is operating in NE-DC and has PSCell and up to one SCell configured in SCG, the interruption requirements defined above apply for PSCell and SCell interruptions specified in clause 7.36 and NR PCell and NR SCell interruptions specified in TS 38.133 [50].

## 7.7.6 SCell Activation Delay Requirement for Deactivated PUCCH SCell

The requirements in this section shall apply for the UE configured with one downlink SCell and when PUCCH is configured for the SCell being activated.

If the UE has a valid TA for transmitting on an SCell then the UE shall be able to transmit valid CSI report and apply actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{activate_basic}$:

Where:

- A TA is considered to be valid provided that the *TimeAlignmentTimer* [2] assocated with the TAG containing the PUCCH SCell is running.

- $T_{activate_basic}$ is the SCell activation delay as defined in section 7.7.2.

If the UE does not have a valid TA for transmitting on an SCell then the UE shall be capable to perform downlink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{activate_basic}$ and shall be capable to perform uplink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{delay_PUCCH\ SCell}$ and shall transmit valid CSI report for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{delay_PUCCH\ SCell}$, where:

$$T_{delay_PUCCH\ SCell} = T_{activate_basic} + T_1 + T_2 + T_3$$

Where:

- $T_1$ is the delay uncertainty in acquiring the first available PRACH occasion in the PUCCH SCell. T1 is up to 25 subframes and the actual value of $T_1$ shall depend upon the PRACH configuration used in the PUCCH SCell.

- $T_2$ is the delay for obtaining a valid TA command for the sTAG to which the SCell configured with PUCCH belongs. $T_2$ is up to 13 subframes.

- $T_3$ is the delay for applying the received TA for upling transmission. $T_3$ is 6 subframes.

The above delay requirement ($T_{delay_PUCCH\ SCell}$) shall apply provided that:

- The UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within $T_{activate_basic}$ otherwise additional delay to activate the SCell is expected; and
- The RA on PUCCH SCell is not interrupted by the RA on PCell otherwise additional delay to activate the SCell is expected; and
- No SRS carrier based switching occurs during the SCell activation procedure otherwise the PUCCH SCell activation delay ($T_{delay_PUCCH\ SCell}$) can be extended.

The interruption on the PCell specified in section 7.8.2 shall meet all applicable requirements in clause 7.7.2.

## 7.7.7 SCell Activation Delay Requirement for Deactivated PUCCH SCell with Multiple SCells

The requirements in this section shall apply for the UE configured with up to six downlink SCells and when PUCCH is configured for the SCell being activated.

If the UE has a valid TA for transmitting on a PUCCH SCell then the UE shall be able to transmit valid CSI report and apply actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+ T_{activate_total}$:

Where:

- A TA is considered to be valid provided that the *TimeAlignmentTimer* [2] assocated with the TAG containing the PUCCH SCell is running.
- $T_{activate_total}$ is the SCell activation delay as defined in section 7.7.4.

If the UE does not have a valid TA for transmitting on an SCell then the UE shall be capable to perform downlink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{activate_basic}$ and shall be capable to perform uplink actions related to the SCell activation command as specified in [17] for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{delay_PUCCH_multiple_SCells}$ and shall transmit valid CSI report for the SCell being activated on the PUCCH SCell no later than in subframe $n+T_{delay_PUCCH_multiple_SCells}$, where:

$$T_{delay_PUCCH\ multiple_SCells} = T_{activate_total} + T_1 + T_2 + T_3$$

Where:

- $T_1$, $T_2$ and $T_3$ are defined in section 7.7.6

The above delay requirement ($T_{delay_PUCCH\ _multiple_SCells}$) shall apply provided that:

- The UE has received a PDCCH order to initiate RA procedure on the PUCCH SCell within $T_{activate_basic}$ otherwise additional delay to activate the SCell is expected; and
- The RA on PUCCH SCell is not interrupted by the RA on PCell otherwise additional delay to activate the SCell is expected; and
- No SRS carrier based switching occurs during the SCell activation procedure otherwise the PUCH SCell activation delay ($T_{delay_PUCCH\ multiple_SCells}$) can be extended.

The interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall meet all applicable requirements in clause 7.7.4.

## 7.7.8 SCell Deactivation Delay Requirement for Activated PUCCH SCell

The requirements in this section shall apply for the UE configured with one downlink SCell and when PUCCH is configured for the SCell being activated.

The UE shall deactivate a SCell configured with PUCCH and meet the SCell deactivation delay requirements specified in section 7.7.3.

The interruption on the PCell specified in section 7.8.2 shall meet all applicable requirements in clause 7.7.3.

## 7.7.9 SCell Deactivation Delay Requirement for Activated PUCCH SCell with Multiple SCells

The requirements in this section shall apply for the UE configured with up to six downlink SCells and when PUCCH is configured for the SCell being deactivated.

The UE shall deactivate a SCell configured with PUCCH and meet the SCell deactivation delay requirements specified in section 7.7.5.

The interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall meet all applicable requirements in clause 7.7.5.

## 7.7.10 SCell Activation Delay Requirement for Deactivated SCell under Frame Structure 3

The requirements in this section shall apply for E-UTRA carrier aggregation of one FDD PCell or one TDD PCell and one SCell following the frame structure type 3 [16].

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command as specified in [17] for the SCell being activated no later than in subframe $n+T_{activate_basic_FS3}$, provided the following conditions are met for the SCell:

- During the period equal to max(5 measCycleSCell, 5 DRX cycles) before the reception of the SCell activation command:
  - the UE has sent a valid measurement report for the SCell being activated and
  - the SCell being activated remains detectable according to the cell identification conditions specified in section 8.3.3.2,
- SCell being activated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2.

$T_{activate_basic_FS3} = 16\ ms + T_{DMTC_duration} + (L+2) * T_{DMTC_periodicity}$, where

$T_{DMTC_duration}$ =6 ms is the DMTC duration [2],

$T_{DMTC_periodicity}$ is the periodicity of the DMTC [2],

*L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time.

Otherwise upon receiving the SCell activation command in subframe *n*, the UE shall be capable to transmit a valid CSI report and apply actions related to the activation command as specified in [17] for the SCell being activated no later than in subframe $n+T_{activate_basic_FS3}$, provided the SCell can be successfully detected on the first attempt. In this case, Tactivate_basic_FS3 is defined as follows.

$T_{activate_basic_FS3} = 16\ ms + T_{DMTC_duration} + (L+3) * T_{DMTC_periodicity}$, where

$T_{DMTC_duration}$ = 6 ms is the DMTC duration [2],

$T_{DMTC_periodicity}$ is the periodicity of the DMTC [2],

*L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time.

If there is no reference signal received for the CSI measurement over the delay corresponding to the minimum requirements specified above, then the UE shall report corresponding valid CSI for the activated SCell on the next available uplink reporting resource after receiving the reference signal.

If there are no uplink resources for reporting the valid CSI in subframe $n+ T_{activate_basic_FS3}$ then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

The valid CSI is based on the UE measurement and corresponds to any CQI value specified in [3] with the exception of CQI index = 0 (out of range) provided:

- the conditions in section 7.7 are met over the entire SCell activation delay and
- the conditions for CQI reporting defined in Section 7.2.3 of [3] are met.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with ShortTTI- r15 not configured and ShortProcessingTime=FALSE;
- not occur before subframe *n+4* and not occur after subframe *n+8* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;
- not occur before subframe *n+2* and not occur after subframe *n+6* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;
- not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the activation command is transmitted on the PDSCH with ShortTTI- r15 not configured and ShortProcessingTime=FALSE;
- not occur before subframe *n+4* and not occur after subframe *n+10* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

Starting from the subframe specified in Section 4.3 of [3] and until the UE has completed the SCell activation, the UE shall send CSI with CQI index = 0 (out of range) if the UE has available uplink resources to report for the SCell.

## 7.7.11 SCell Deactivation Delay Requirement for Activated SCell under Frame Structure 3

The requirements in this section shall apply for the UE configured with one downlink SCell. The requirements in this section shall apply for E-UTRA carrier aggregation of one FDD PCell or one TDD PCell and the SCell following the frame structure type 3 [16].

Upon receiving SCell deactivation command or upon expiry of the *sCellDeactivationTimer* in subframe *n*, the UE shall accomplish the deactivation actions specified in [17] for the SCell being deactivated no later than in subframe *n+8*.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
- not occur before subframe *n+4* and not occur after subframe *n+8* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

- not occur before subframe *n+2* and not occur after subframe *n+6* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+10* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

## 7.7.12 SCell Activation Delay Requirement for Deactivated SCell with Multiple Downlink SCells under Frame Structure 3

While activating a SCell, if any other SCell is activated, deactivated, configured or deconfigured by the UE, the UE shall meet the SCell activation delay requirements ($T_{activate_total_FS3}$) according to the following expression:

$$T_{activate_total_FS3} = T_{activate_basic_FS3} + T_{DMTC_periodicity} \times \sum_{i=1}^{N-1} K_i$$

where

$T_{activate_total_FS3}$ is the total time to activate a SCell and is expressed in subframes,

$T_{activate_basic_FS3_}$ is the SCell activation delay for the SCell, as specified in section 7.7.10,

$T_{DMTC_periodicity}$ is the periodicity of the DMTC [2],

$K_i$ ($0 \le K_i \le 3$) is the number of times the other $i^{th}$ SCell is activated, deactivated, configured or deconfigured while the SCell is being activated,

N ($2 \le N \le 4$) is the maximum number of SCells supported by the UE.

While activating a SCell:

- When PCell belongs to E-UTRA FCC, the interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+8* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

  - not occur before subframe *n+2* and not occur after subframe *n+6* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

- When the PCell belongs to E-UTRA TDD, the interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+10* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

Starting from the subframe specified in section 4.3 of [3] and until the UE has completed the SCell activation, the UE shall send CSI with CQI index = 0 (out of range) if the UE has available uplink resources to report for the SCell being activated.

## 7.7.13 SCell Deactivation Delay Requirement for Activated SCell with Multiple Downlink SCells under Frame Structure 3

The UE shall deactivate a SCell and meet the SCell deactivation delay requirements specified in section 7.7.11 regardless of whether any other SCell is activated, deactivated, configured or deconfigured or not by the UE during the SCell deactivation delay.

While deactivating a SCell:

- When PCell belongs to E-UTRA FDD, the interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+8* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

  - not occur before subframe *n+2* and not occur after subframe *n+6* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

  - not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

- When PCell belongs to E-UTRA TDD, the interruption on the PCell and/or on the activated SCell specified in section 7.8.2 shall

  - not occur before subframe *n+5* and not occur after subframe *n+11* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

  - not occur before subframe *n+4* and not occur after subframe *n+10* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

  - not occur before subframe *n+3* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

## 7.7.14 SCell Activation Delay Requirement for Dormant SCell

The requirements in this section shall apply for the UE capable of supporting *dormantSCellState* [2] and configured with one downlink SCell in dormant state. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

The delay within which the UE shall be able to activate the dormant SCell depends upon the specified conditions.

Upon receiving SCell activation command in subframe *n*, the UE shall be ready to receive the downlink grant and apply actions related to the activation command as specified in TS 36.321 [17] for the SCell being activated no later than in subframe $n+N_{act_dormant}$ provided the following conditions are met for the SCell:

- UE has been periodically sending a valid CQI report for the dormant SCell being activated before the reception of the SCell activation command:
  - the SCell being activated remains detectable according to the cell identification conditions specified in section 8.3.3.2,
- MBSFN subframes are not configured in the PCell
- SCell being activated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2 where

  when PCell belongs to E-UTRAN FDD,

  $N_{act_dormant}$ = 8;

  $N_{act_dormant}$ = 7 if the activation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

  $N_{act_dormant}$ = 6 if the activation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

  and when the PCell belongs to E-UTRAN TDD,

  $N_{act_dormant}$ = 11;

  $N_{act_dormant}$ = 10 if the activation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

  $N_{act_dormant}$ = 9 if the activation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

Otherwise, upon receiving the SCell activation command for a dormant SCell, the SCell activation delay requirement as specified by subclause 7.7.2 shall apply to the dormant SCell being activated.

The SCell activation delay specified in this section can be extended with each SRS carrier-based switching to any carrier occuring during the SCell activation procedure.

Scell activation delay and interruption requirements are defined assuming that MBSFN subframe(s) are not configured. Additional delay may be expected if MBSFN subframe(s) are configured.

In addition to the CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 36.321 [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+7* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
- not occur before subframe *n+4* and not occur after subframe *n+6* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;
- not occur before subframe *n+3* and not occur after subframe *n+5* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;
- not occur before subframe *n+2* and not occur after subframe *n+4* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;
- not occur before subframe *n+3* and not occur after subframe *n+5* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+10* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;
- not occur before subframe *n+4* and not occur after subframe *n+9* if the activation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+8* if the activation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

## 7.7.15 SCell Hibernation Delay Requirement for Activated SCell

The requirements in this section shall apply for the UE capable of supporting *dormantSCellState* [2] and configured with one activated downlink SCell. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

Upon receiving SCell hibernation command or upon expiry of the *sCellHibernationTimer* in subframe *n*, the UE shall accomplish the hibernation actions specified in TS 36.321 [17] for the SCell being hibernated no later than in subframe $n+N_{hibernate}$ where

$N_{hibernate}$ =8

$N_{hibernate}$ =7 if the hibernation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{hibernate}$ =6 if the hibernation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

The PCell interruption upon receiving the hibernation command specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+8* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

- not occur before subframe *n+2* and not occur after subframe *n+6* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+10* if the deactivation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+9* if the deactivation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

## 7.7.16 SCell Hibernation Delay Requirement for Deactivated SCell

The requirements in this section shall apply for the UE capable of supporting *dormantSCellState* [2] and configured with one downlink SCell. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

The delay within which the UE shall be able to hibernate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell hibernation command in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command as specified in TS 36.321 [17] for the SCell being in the dormant state no later than in subframe $n+N_{hibernate_known}$ provided the following conditions are met for the SCell:

- During the period equal to max(5 measCycleSCell, 5 DRX cycles) before the reception of the SCell hibernation command:

  - the UE has sent a valid measurement report for the SCell being hibernated and

- the SCell being hibernated remains detectable according to the cell identification conditions specified in section 8.3.3.2,

- SCell being hibernated also remains detectable during the SCell hibernation delay according to the cell identification conditions specified in section 8.3.3.2 where

$N_{hibernate_known}$ =24;

$N_{hibernate_known}$ =23 if the hibernation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{hibernate_known}$ =22 if the hibernation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

Otherwise upon receiving the SCell hibernation command in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the hibernation command as specified in TS 36.321 [17] for the SCell being in the dormant state no later than in subframe *n*+ $N_{hibernate_unknown}$ provided the SCell can be successfully detected on the first attempt where

$N_{hibernate_unknown}$ =34;

$N_{hibernate_unknown}$ =33 if the hibernation command is transmitted on the PDSCH with *ShortProcessingTime*=TRUE;

$N_{hibernate_unknown}$ =32 if the hibernation command is transmitted on the PDSCH with *ShortTTI*-r15 configured;

If there is no reference signal received for the CSI measurement over the delay corresponding to the minimum requirements specified above, then the UE shall report corresponding valid CSI for the dormant SCell on the next available uplink reporting resource after receiving the reference signal.

The SCell hibernation delay specified in this section can be extended with each SRS carrier based switching to any carrier occuring during the SCell activation procedure.

If there are no uplink resources for reporting the valid CSI in subframe *n*+ $N_{hibernate_known}$ or *n*+ $N_{hibernate_unknown}$ or uplink transmission is interrupted due to SRS carrier based switching then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

The valid CSI is based on the UE measurement and corresponds to any CQI value specified in TS 36.213 [3] with the exception of CQI index = 0 (out of range) provided:

- the conditions in section 7.7 are met over the entire SCell hibernation delay and

- the conditions for CQI reporting defined in Section 7.2.3 of TS 36.213 [3] are met.

In addition to CSI reporting defined above, UE shall also apply other actions related to the hibernation command specified in TS 36.321 [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+9* if the hibernation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+8* if the hibernation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the hibernation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot;

- not occur before subframe *n+2* and not occur after subframe *n+6* if the hibernation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, proc-Timeline-r15= nplus6set1 or proc-Timeline-r15= nplus6set2;

- not occur before subframe *n+3* and not occur after subframe *n+7* if the hibernation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus8set2,

When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall

- not occur before subframe *n+5* and not occur after subframe *n+11* if the hibernation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=FALSE*;

- not occur before subframe *n+4* and not occur after subframe *n+10* if the hibernation command is transmitted on the PDSCH with *ShortTTI- r15* not configured and *ShortProcessingTime=TRUE*;

- not occur before subframe *n+3* and not occur after subframe *n+9* if the hibernation command is transmitted on the PDSCH with *dl-STTI-Length-r15*=slot.

Starting from the subframe specified in section 4.3 of TS 36.213 [3] and until the UE has completed the SCell hibernation, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCell.

## 7.7.17 SCell Deactivation Delay Requirement for Dormant SCell

The requirements in this section shall apply for the UE capable of supporting *dormantSCellState* [2] and configured with one dormant downlink SCell. The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

The SCell deactivation delay of the dormant SCell shall meet the requirement as specified in sub-clauses 7.7.3.

## 7.7.18 Direct SCell Activation and Hibernation Delay Requirement

The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

If the parameter *sCellState* is set to *activated* for the SCell within RRC reconfiguration message [2] then the UE capable of the direct SCell activation shall configure that SCell in activated state upon successful completion of the RRC reconfiguration procedure within the specified delay. If the parameter *sCellState* is set to *dormant* for the SCell within RRC reconfiguration message [2] then the UE capable of the direct SCell hibernation shall configure that SCell in dormant state upon successful completion of the RRC reconfiguration procedure within the specified delay. The UE capable of the direct SCell activation shall support direct activation to active state within $N_{direct}$ for at least 1 inter-band SCell or 1 intra-band SCell. The UE capable of the direct SCell hibernation shall support direct hibernation to dormant state within $N_{direct}$ for at least 1 inter-band SCell or 1 intra-band SCell.

The delay within which the UE shall be able to configure one or more direct configured SCells in activated or dormant state depends upon the specified conditions.

Upon receiving directly activated or directly hibernated SCell configuration in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions as specified in [17] for the directly activated or directly hibernated SCell no later than in subframe $n+N_{direct}$

Where:

$N_{direct} = T_{RRC_Process} + T_1 + T_{time_direct}$

$T_{RRC_Process}$: It is the RRC procedure delay defined in section 11.2 of TS 36.331 [2],

$T_1$: Delay from subframe n+ $T_{RRC_Process}$ until the transmission of RRCConnectionReconfigurationComplete message

Note: $T_1$ is UE implementation dependent.

$T_{time_direct}$ is the direct SCell activation delay.

If the SCell is known, then $T_{time_direct}$ is 20ms. If the SCell is unknown, then $T_{time_direct}$ is 30ms provided the SCell can be successfully detected on the first attempt.

The SCell is known provided the following conditions are met for the SCell:

- During the last 5 seconds before the reception of the direct SCell configuration command:

  - the UE has sent a valid measurement report for the SCell being directly activated or directly hibernated, and

  - the SCell being directly activated or directly hibernated remains detectable according to the cell identification conditions specified in section 8.3.3.2,

- SCell being directly activated or directly hibernated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2

Otherwise, the SCell is unknown.

The UE capable of the direct SCell activation shall support direct activation of up to 2 SCell(s). The UE capable of the direct SCell hibernation shall support direct hibernation of up to 2 SCell(s). If more than one SCells are directly activated simultaneously to active state or directly hibernated simultaneously to dormant state, the direct activation or hibernation delay requirements shall be fulfilled for at least one of the SCells being directly activated or hibernated, and additional relaxation in the activation delay or hibernation delay is allowed for the rest of SCells being directly activated or hibernated simultaneously. Upon receiving the RRC reconfiguration message in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the RRC reconfiguration of $j^{th}$ SCell ($j > 1$) in dormant or activated state as specified in [17] no later than in subframe $n+ N_{direct} + (j-1)*T_{time_direct}$ provided the SCell can be successfully detected on the first attempt.

Where:

- $j$ ($1 < j \leq M$) denotes the index of SCell indicated in the RRC reconfiguration message, where $M$ is the number of SCells included in the RRC reconfiguration message and shall not exceed the maximum number of SCells supported by the UE, $N$.

If there is no reference signal received for the CSI measurement over the delay corresponding to the minimum requirements specified above, then the UE shall report corresponding valid CSI for the activated SCell or hibernated SCell on the next available uplink reporting resource after receiving the reference signal.

If there are no uplink resources for reporting the valid CSI in subframe $n+ N_{direct} + (j-1)*T_{time_direct}$ for the j-th SCells being activated or hibernated or uplink transmission is interrupted due to SRS carrier-based switching, then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

The valid CSI is based on the UE measurement and corresponds to any CQI value specified in [3] with the exception of CQI index = 0 (out of range) provided:

- the conditions in section 7.7 are met over the entire SCell activation delay and

- the conditions for CQI reporting defined in Section 7.2.3 of [3] are met.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation or hibernation command specified in [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated or hibernated.

The SCell direct activation delay and direct hibernation delay specified in this section can be extended if SRS carrier-based switching occurs during the SCell direct activation or direct hibernation procedure.

If the UE is configured with only PCell then the interruption shall occur on PCell due to the direct SCell activation or hibernation of the j-th SCell as follows:

- When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall not occur before subframe $n+T_{RRC_Process} +T_1 + (j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process} +T_1 + T_{interupt_window} + (j-1)*T_{time_direct}$, where $T_{interupt_window} = 5$ ms.

- When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall not occur before subframe $n+T_{RRC_Process} +T_1 + (j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process} +T_1 + T_{interupt_window} + (j-1)*T_{time_direct}$, where $T_{interupt_window} = 7$ ms.

If the UE is configured with at least one SCell in activated state then the interruption shall occur on PCell and on all the SCells in activated state due to the direct SCell activation or hibernation of the j-th SCell as follows:

- The interruption on the PCell and/or on the SCell in activated state shall not occur before subframe $n+T_{RRC_Process} +T_1 + (j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process} +T_1 + T_{interupt_window} + (j-1)*T_{time_direct}$ if:

  - the PCell and/or the SCell in activated state being interrupted and the SCell being configured in activated state belong to E-UTRA TDD, where $T_{interupt_window} = 7$ ms, or

  - the the SCell in activated state being interrupted and the SCell being configured in activated or dormant state belong to E-UTRA FDD and the PCell belongs to E-UTRA TDD, where $T_{interupt_window}$=7ms.

- Otherwise, the interruption on PCell and/or on the SCell in activated or dormant state shall not occur before subframe $n+T_{RRC_Process}+T_1+(j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process}+T_1+T_{interupt_window}+(j-1)*T_{time_direct}$, where $T_{interupt_window}$ = 5 ms.

Starting from the subframe n+ $T_{RRC_Process}+T_1$ until the UE has completed the direct SCell activation to activated state or the direct SCell hibernation to dormant state, the UE shall report CQI index = 0 (out of range) if the UE has available uplink resources to report CQI for the SCell.

## 7.7.19 Direct SCell Activation and Hibernation Delay Requirement at RRC Reconfiguration during Handover

The requirements in this section are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation. The requirements apply for when the parameter *sCellState* is included to indicate the direct SCell activation is received in a handover command.

The requirements in this section apply for normal handover.

*Editor's Note: Requirements for RACH-less handover, Make-before-break handover and combined make-before break and RACH-less handover are FFS.*

If the parameter *sCellState* is set to *activated* for the SCell within RRC reconfiguration message [2] then the UE capable of the direct SCell activation shall configure that SCell in activated state upon successful completion of the RRC reconfiguration procedure within the specified delay. If the parameter *sCellState* is set to *dormant* for the SCell within RRC reconfiguration message [2] then the UE capable of the direct SCell hibernation shall configure that SCell in dormant state upon successful completion of the RRC reconfiguration procedure within the specified delay. The UE capable of the direct SCell activation shall support direct activation or direct hibernation of one SCell within $N_{direct.}$ for at least 1 inter-band SCell or 1 intra-band SCell. The UE capable of the direct SCell hibernation shall support direct hibernation to dormant state within $N_{direct}$ for at least 1 inter-band SCell or 1 intra-band SCell.

The delay within which the UE shall be able to configure one or more direct configured SCells in activated or dormant state depends upon the specified conditions.

Upon receiving a handover command including directly activated or directly hibernated SCell configuration in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions as specified in TS 36.321 [17] for the directly activated or directly hibernated SCell no later than in subframe $n+N_{direct}$

where:

$N_{direct} = T_{RRC_process} + T_{interrupt} + T_2 + T_3 + T_{time_direct}$

$T_{RRC_Process}$ =20ms which is the RRC procedure delay defined for SCell addition in section 11.2 of TS 36.331 [2],

$T_{interrupt}$ is the interruption time as defined in subclause 5.1.2.1.2.

$T_2$ is the delay for obtaining a valid TA command for the target PCell from the target PCell and the scheduling grant for sending valid CSI report in the target PCell. $T_2$ is up to 13 subframes.

$T_3$ is the delay for applying the received TA for upling transmission in the target PCell, and greater than or equal to 6 subframes.

$T_{time_direct}$ is the direct SCell activation delay.

If the SCell is known, then $T_{time_direct}$ is 20ms. If the SCell is unknown, then $T_{time_direct}$ is 30ms provided the SCell can be successfully detected on the first attempt.

The SCell is known provided the following conditions are met for the SCell:

- During the last 5 seconds before the reception of the handover including the direct SCell configuration command:
  - the UE has sent a valid measurement report for the SCell being directly activated or directly hibernated, and
  - the SCell being directly activated or directly hibernated remains detectable according to the cell identification conditions specified in section 8.3.3.2,

- SCell being directly activated or directly hibernated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2

Otherwise, the SCell is unknown.

The UE capable of the direct SCell activation shall support direct activation in handover command of up to 2 SCell(s). The UE capable of the direct SCell hibernation shall support direct hibernation in handover command of up to 2 SCell(s). If the handover command includes that more than one SCells are directly activated simultaneously to active state or directly hibernated simultaneously to dormant state, the direct activation or hibernation delay requirements shall be fulfilled for at least one of the SCells being directly activated or hibernated, and additional relaxation in the activation delay or hibernation delay is allowed for the rest of SCells being directly activated or hibernated simultaneously. Upon receiving the handover command message in subframe *n*, the UE shall be capable to transmit valid CSI report and apply actions related to the RRC reconfiguration of $j^{th}$ SCell ($j > 1$) in dormant or activated state as specified in TS 36.321 [17] no later than in subframe $n+ N_{direct} + (j-1)*T_{time_direct}$ provided the SCell can be successfully detected on the first attempt.

Where:

- $j$ ($1 < j \leq M$) denotes the index of SCell indicated in the handover command message, where $M$ is the number of SCells included in the handover command message and shall not exceed the maximum number of SCells supported by the UE, $N$.

If there is no reference signal received for the CSI measurement over the delay corresponding to the minimum requirements specified above, then the UE shall report corresponding valid CSI for the activated SCell or hibernated SCell on the next available uplink reporting resource after receiving the reference signal.

If there are no uplink resources for reporting the valid CSI in subframe $n+ N_{direct}$ for the first SCell being activated or hibernated, or $n+ N_{direct} + (j-1)*T_{time_direct}$ for the j-th SCells being activated or hibernated, or uplink transmission is interrupted due to SRS carrier-based switching, then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

The valid CSI is based on the UE measurement and corresponds to any CQI value specified in TS 36.213 [3] with the exception of CQI index = 0 (out of range) provided:

- the conditions in section 7.7 are met over the entire SCell activation delay and
- the conditions for CQI reporting defined in Section 7.2.3 of TS 36.213 [3] are met.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation or hibernation command specified in TS 36.321 [17] for an SCell at the first opportunities for the corresponding actions once the SCell is activated or hibernated.

The SCell direct activation delay and direct hibernation delay specified in this section can be extended if SRS carrier-based switching occurs during the SCell direct activation or direct hibernation procedure.

Any interruption on PCell due to the direct SCell activation or hibernation of the first SCell shall occur as follows:

- When PCell belongs to E-UTRA FDD, the PCell interruption specified in section 7.8.2 shall not occur before subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3$ and not occur after subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + T_{interupt_window}$, where $T_{interupt_window} = 5$ ms.
- When PCell belongs to E-UTRA TDD, the PCell interruption specified in section 7.8.2 shall not occur before subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3$ and not occur after subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + T_{interupt_window}$, where $T_{interupt_window} = 5$ ms.

If the UE is configured with more than one SCell in activated or hibernation state, any interruption on PCell and on all the SCells in activated state due to the direct SCell activation or hibernation of the j-th SCell shall occur as follows:

- The interruption on the PCell and/or on the SCell in activated state shall not occur before subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + (j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + T_{interupt_window} + (j-1)*T_{time_direct}$ if:
  - the PCell and/or the SCell in activated state being interrupted and the SCell being configured in activated state belong to E-UTRA TDD, where $T_{interupt_window}$=7ms, or

- the the SCell in activated state being interrupted and the SCell being configured in activated or dormant state belong to E-UTRA FDD and the PCell belongs to E-UTRA TDD, where $T_{interupt_window}$ = 7 ms.

- Otherwise, the interruption on PCell and/or on the SCell in activated or dormant state shall not occur before subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + (j-1)*T_{time_direct}$ and not occur after subframe $n+T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + T_{interupt_window} + (j-1)*T_{time_direct}$, where $T_{interupt_window}$ = 5 ms.

Starting from the subframe n+ $T_{RRC_Process} + T_{interrupt} + T_2 + T_3 + T_{interupt_window}$ until the UE has completed the direct SCell activation to activated state or the direct SCell hibernation to dormant state, the UE shall report CQI index = 0 (out of range), provided that the UE has available uplink resources to report CQI for the SCell.

# 7.8 Interruptions with Carrier Aggregation

## 7.8.1 Introduction

This section contains the requirements related to the interruptions on PCell and activated SCell if configured, when up to six SCells are configured, deconfigured, hibernated, activated, dormant or deactivated, or when SRS carrier based switching is performed between the configured component carriers. Unless explicitly stated otherwise, the requirements in Section 7.8 shall apply for:

- E-UTRA FDD CA,
- E-UTRA TDD CA,
- E-UTRA TDD-FDD CA,
- inter-band CA where PCell is FDD or TDD and all the SCells are following the frame structure type 3 [16],
- E-UTRA CA where at least one SCell is FeMBMS/Unicast-mixed SCell.

A UE causing interruptions during measurements on deactivated SCC shall indicate to the network a need for an interruption control pattern.

Note: interruptions at SCell addition and release, activation, deactivation and hibernation and during measurements on SCC may not be required by all UEs.

Note: interruptions during SRS carrier based switching between the configured component carriers may not be required by all UEs.

Editor's Note: The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition, release and hibernation or MAC control signalling [17] for SCell activation, deactivation and hibernation command. How to specify this is FFS.

## 7.8.2 Requirements

### 7.8.2.1 Interruptions at SCell addition/release for intra-band CA

When an intra-band SCell is added or released as defined in [2] the UE is allowed an interruption of up to 5 subframes on PCell during the RRC reconfiguration procedure [2]. This interruption is for both uplink and downlink of PCell.

### 7.8.2.2 Interruptions at SCell addition/release for inter-band CA

When an inter-band SCell is added or released as defined in [2] the UE that requires interruption is allowed an interruption of up to 1 subframe on PCell during the RRC reconfiguration procedure [2]. This interruption is for both uplink and downlink of PCell.

### 7.8.2.3 Interruptions at SCell activation/deactivation for intra-band CA

When an intra-band SCell is activated or deactivated as defined in [17] the UE is allowed an interruption of up to 5 subframes on PCell during the activation/deactivation delay defined in Section 7.7. This interruption is for both uplink and downlink of PCell.

### 7.8.2.4 Interruptions at SCell activation/deactivation for inter-band CA

When an inter-band SCell is activated or deactivated as defined in [17] the UE that requires interruption is allowed an interruption of up to 1 subframe on PCell during the activation/deactivation delay defined in Section 7.7. This interruption is for both uplink and downlink of PCell.

### 7.8.2.5 Interruptions during measurements on SCC for intra-band CA

If the UE supports ncsg-r14 and has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

PCell interruptions due to measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer.

If indicated by the network using IE *allowInterruptions* [2], PCell interruptions due to measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2].

Each interruption shall not exceed 5 subframes.

### 7.8.2.6 Interruptions during measurements on SCC for inter-band CA

If the UE supports ncsg-r14 and has been configured with NCSG pattern with ID 0,1,2,3, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the UE has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.If the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, PCell interruptions due to measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer.

If the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, and if indicated by the network using IE *allowInterruptions* [2], PCell interruptions due to measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2].

Each interruption shall not exceed 1 subframe.

### 7.8.2.7 Interruptions at SCell addition/release with multiple downlink SCells

When any number of SCells between one and six is added or released using the same *RRCConnectionReconfiguration* message as defined in [2], the UE is allowed an interruption on PCell and on any activated SCell during the RRC reconfiguration procedure as follows:

- an interruption on PCell:
  - of up to 1 subframe, if the PCell is not in the same band as any of the SCells being added or released, or
  - of up to 5 subframes, if the PCell is in the same band as any of the SCells being added or released;
- an interruption on any activated SCell:
  - of up to 1 subframe, if the activated SCell is not in the same band as any of the SCells being added or released, or
  - of up to 5 subframes, if the activated SCell is in the same band as any of the SCells being added or released.

### 7.8.2.8 Interruptions at SCell activation/deactivation with multiple downlink SCells

When any number of SCells between one and six is activated or deactivated using the same MAC control element as defined in [17], the UE is allowed an interruption on PCell and on any activated SCell during the SCell activation/deactivation procedure [17] as follows:

- an interruption on PCell:
  - of up to 1 subframe, if the PCell is not in the same band as any of the SCells being activated or deactivated, or
  - of up to 5 subframes, if the PCell is in the same band as any of the SCells being activated or deactivated;
- an interruption on any activated SCell:
  - of up to 1 subframe, if the activated SCell is not in the same band as any of the SCells being activated or deactivated, or
  - of up to 5 subframes, if the activated SCell is in the same band as any of the SCells being activated or deactivated.

### 7.8.2.9 Interruptions during measurements on SCC with multiple downlink SCells

If the PCell is not in the same band as any of the SCells being activated or deactivated and if the UE supports ncsg-r14 and has been configured with NCSG pattern with ID 0,1,2,3, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the PCell is not in the same band as any of the SCells being activated or deactivated and if the UE has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the PCell is in the same band as any of the SCells being activated or deactivated or if the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, when one SCell is deactivated, the UE is allowed due to measurements on the SCC with deactivated SCell:

- an interruption on PCell with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] for the deactivated SCell is 640 ms or longer.
- an interruption on PCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated SCell if indicated by the network using IE *allowInterruptions* [2],

  Each interruption shall not exceed:
  - 1 subframes if the PCell is not in the same band as the deactivated SCell
  - 5 subframes if the PCell is in the same band as the deactivated SCell
- an interruption on any activated SCell with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] for the deactivated SCell is 640 ms or longer .
- an interruption on any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated SCell if indicated by the network using IE *allowInterruptions* [2].

  Each interruption shall not exceed:
  - 1 subframes if the activated SCell is not in the same band as the deactivated SCell
  - 5 subframes if the activated SCell is in the same band as the deactivated SCell

If the PCell is in the same band as any of the SCells being activated or deactivated or if the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, when two, three, four, five, or six SCells are deactivated, the UE is allowed due to measurements on the SCCs with deactivated SCells:

- an interruption on PCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [2] for the deactivated SCells is 640 ms or longer.
- an interruption on PCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated SCells if indicated by the network using IE *allowInterruptions* [2].

- an interruption on an activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [2] for the deactivated SCells is 640 ms or longer.

- an interruption on an activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [2] for the deactivated SCells if indicated by the network using IE *allowInterruptions* [2].

  Each interruption on the PCell shall not exceed:

  - 1 subframes if the PCell is not in the same band as any of the deactivated SCells

  - 5 subframes if the PCell is in the same band as any of the deactivated SCells

  Each interruption on the activated Cell shall not exceed:

  - 1 subframe if the activated SCell is not in the same band as any of the deactivated SCells

  - 5 subframes if the the activated SCell is in the same band as any of the deactivated SCells

### 7.8.2.10 Interruptions at overlapping addition/release/activation/deactivation of SCells

If a UE is commanded by the network to sequentially add/release/activate/deactivate SCells, and a new procedure of addition/release/activation/deactivation of SCell(s) takes place before the completion of previous procedure of addition/release/activation/deactivation of SCell(s), the interruptions on PCell due to sequential addition/release/activation/deactivation of SCells shall not exceed the sum of the allowed interruptions on the PCell caused by each of the addition/release/activation/deactivation procedures, and the interruptions on already activated SCell due to sequential addition/release/activation/deactivation of SCells shall not exceed the sum of the allowed interruptions on the SCell caused by each of the addition/release/activation/deactivation procedures, as defined in above sections.

### 7.8.2.11 Interruptions during RSSI measurements on one SCC under Frame Structure 3

PCell interruptions due to RSSI measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when any of the configured *rmtc-Period* [2] and *measCycleSCell* [2] is 640 ms or longer.

Each allowed interruption on the PCell shall not exceed 1 subframe.

### 7.8.2.12 Interruptions during RSSI measurements on multiple SCCs under Frame Structure 3

If the UE supports ncsg-r14 and has been configured with NCSG pattern with ID 0,1,2,3, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the UE has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, and if one SCell is deactivated,

- the UE is allowed due to RSSI measurements on the SCC with deactivated SCell:

  - an interruption on PCell with up to 0.5% probability of missed ACK/NACK when any of the configured *rmtc-Period* [2] and the configured *measCycleSCell* [2] for the deactivated SCell is 640 ms or longer,

  - an interruption on any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *rmtc-Period* [2] and the configured *measCycleSCell* [2] for the deactivated SCell is 640 ms or longer.

- no interruption is allowed if both of the configured *rmtc-Period* [2] and the configured *measCycleSCell* [2] for the deactivated SCell are below 640 ms.

If the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers and if two, three, four, five, or six SCells are deactivated,

- the UE is allowed due to RSSI measurements on the SCCs with deactivated SCells:

  - an interruption on PCell with up to 0.5% probability of missed ACK/NACK when:

    any of the configured *rmtc-Period* [2] and the configured *measCycleSCell* [2] for the deactivated SCells is 640 ms or longer, or

    RSSI windows with the length of *measDuration* [2] for at least some of the SCCs with the deactivated SCells within their respective *rmtc-Period* [2] are not within 20 ms;

  - an interruption on an activated SCell with up to 0.5% probability of missed ACK/NACK when:

    any of the configured *rmtc-Period* [2] and the configured and the configured *measCycleSCell* [2] for the deactivated SCells is 640 ms or longer, or

    RSSI windows with the length of *measDuration* [2] for at least some of the SCCs with the deactivated SCells within their respective *rmtc-Period* [2] are not within 20 ms.

- no interruption is allowed if both of the configured *rmtc-Period* [2] and the configured *measCycleSCell* [2] for the deactivated SCell are below 640 ms and RSSI windows with the length of *measDuration* [2] for all the SCCs with the deactivated SCells within their respective *rmtc-Period* [2] are within 20 ms.

Each allowed interruption shall not exceed:

- 1 subframe on the PCell, and
- 5 subframes on the activated SCell.

### 7.8.2.13 Interruptions at SRS carrier based switching

A PUSCH-less SCC is a TDD SCC without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [16] and/or non-contention based PRACH on a PUSCH-less SCC, the UE can perform carrier based switching to one or more PUSCH-less SCCs from a CC with PUSCH or from another PUSCH-less SCC prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured CC to another activated TDD CC;
- the PUSCH-less SCCs to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [2] for periodic SRS transmission or indicated by PDCCH for PRACH;
- the serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [2];
- the SRS switching is not colliding with any other transmission with higher priority defined in [3];
- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in [3];
- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other CCs.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

The interruption on PCC and each of the activated SCCs during the switching to the PUSCH-less SCC shall not exceed 2 subframes including the first subframe where SRS transmission is configured on the PUSCH-less SCC.

The interruption on PCC and each of the activated SCCs during the switching from the PUSCH-less SCC shall not exceed 2 subframes including the last subframe where SRS transmission is configured on the PUSCH-less SCC.

### 7.8.2.14 Interruptions at SCell activation and deactivation of dormant SCell for intra-band CA

When an intra-band FDD dormant SCell is activated and deactivated as defined in TS 36.321 [17] the UE capable of supporting *dormantSCellState* [2] is allowed an interruption of up to 2 subframes on PCell during the activation and deactivation defined in Section 7.7, provided that MBSFN subframes are not configured in the PCell. This interruption is for both uplink and downlink of PCell.

When an intra-band TDD dormant SCell is activated and deactivated as defined in TS 36.321 [17] the UE capable of supporting *dormantSCellState* [2] is allowed an interruption of up to 5 subframes on PCell during the activation and deactivation defined in Section 7.7, provided that MBSFN subframes are not configured in the PCell. This interruption is for both uplink and downlink of PCell.

### 7.8.2.15 Interruptions at SCell activation and deactivation of dormant SCell for inter-band CA

When an inter-band dormant SCell is activated and deactivation as defined in TS 36.321 [17] the UE that is capable of supporting *dormantSCellState* [2] and requires interruption is allowed an interruption of up to 1 subframe on PCell during the activation and deactivation defined in Section 7.7. This interruption is for both uplink and downlink of PCell.

### 7.8.2.16 Interruptions at SCell activation and deactivation of multiple dormant SCells

When any number of SCells in a dormant state between one and six is activated or deactivated using the same MAC control element as defined in TS 36.321 [17], the UE capable of supporting *dormantSCellState* [2] is allowed an interruption on PCell and on any activated SCell during the SCell activation and deactivation procedure [17] as follows:

- an interruption on PCell:
  - of up to 1 subframe, if the PCell is not in the same band as any of the SCells being activated or deactivated, or
  - of up to 2 subframes, if the PCell is in the same band as any of the FDD SCells being activated or deactivated, and the PCell is not configured with the MBSFN subframes;
  - of up to 5 subframes, otherwise.
- an interruption on any activated SCell:
  - of up to 1 subframe, if the activated SCell is not in the same band as any of the SCells being activated or deactivated, or
  - of up to 2 subframes, if the activated SCell is in the same band as any of the FDD SCells being activated or deactivated and the activated SCell is not configured with the MBSFN subframes.
  - of up to 5 subframes, otherwise.

### 7.8.2.17 Interruptions during CQI measurement on dormant SCell

For a UE capable of supporting *dormantSCellState* [2] and configured with one or more number of dormant SCell(s), an interruption on PCell or any activated SCell(s) due to the periodic CQI measurements of the dormant SCell(s) is allowed with up to 0.5% probability of missed ACK/NACK.

Each interruption shall not exceed

- 1 subframe, if the PCell or the activated SCell is not in the same band as any of the dormant SCells, or
- 2 subframes, if the PCell or the activated SCell is in the same band as any of the FDD dormant SCells, and the PCell or the activated SCell is not configured with the MBSFN subframes;
- 5 subframes, otherwise.

The interruption is for both uplink and downlink of PCell and activated SCell(s).

### 7.8.2.18 Interruptions during RRM measurement on dormant SCell for intra-band CA

For a UE capable of supporting *dormantSCellState* [2] and configured with one or more number of dormant SCell(s), an interruption on PCell or any activated SCell(s) due to measurements of a dormant SCell(s) is allowed with up to 0.5% probability of missed ACK/NACK.

Each interruption shall not exceed

- 1 subframe, if the PCell or the activated SCell is not in the same band as any of the dormant SCells, or
- 2 subframes, if the PCell or the activated SCell is in the same band as any of the FDD dormant SCells, and the PCell or the activated SCell is not configured with the MBSFN subframes;
- 5 subframes, otherwise.

The interruption is for both uplink and downlink of PCell and activated SCell(s).

### 7.8.2.19 Interruptions during RRM measurement on dormant SCell for inter-band CA

For a UE capable of supporting *dormantSCellState* [2] and configured with one or more number of dormant SCell(s), an interruption on PCell or any activated SCell(s) due to measurements of a dormant SCell(s) is allowed with up to 0.5% probability of missed ACK/NACK.

Each interruption shall not exceed

- 1 subframe, if the PCell or the activated SCell is not in the same band as any of the dormant SCells, or
- 2 subframes, if the PCell or the activated SCell is in the same band as any of the FDD dormant SCells, and the PCell or the activated SCell is not configured with the MBSFN subframes;
- 5 subframes, otherwise.

The interruption is for both uplink and downlink of PCell and activated SCell(s).

### 7.8.2.20 Interruptions at SCell hibernation

When any number of SCells between one and six in a activated or deactivated state is hibernated using the same MAC control element as defined in TS 36.321 [17], the UE capable of supporting *dormantSCellState* [2] is allowed an interruption on PCell and on any activated SCell during the SCell hibernation procedure [17] as follows:

- an interruption on PCell:
  - of up to 1 subframe, if the PCell is not in the same band as any of the SCells being hibernated, or
  - of up to 2 subframes, if the PCell is in the same band as any of the FDD SCells being hibernated, and the PCell is not configured with the MBSFN subframes;
  - of up to 5 subframes, otherwise.
- an interruption on any activated SCell:
  - of up to 1 subframe, if the activated SCell is not in the same band as any of the SCells being hibernated, or
  - of up to 2 subframes, if the activated SCell is in the same band as any of the FDD SCells being hibernated and the activated SCell is not configured with the MBSFN subframes.
  - of up to 5 subframes, otherwise.

### 7.8.2.21 Interruptions at direct SCell activation and hibernation

When any number of SCells between one and M is directly activated or hibernated using the same RRC message as defined in TS 36.331 [2], for each of SCell(s) to be directly activated or hibernated, the UE is allowed an interruption on PCell and on any activated SCell during the direct SCell activation and hibernation procedure [2] as follows:

- an interruption on PCell:

- of up to 2 subframe, if the PCell is not in the same band as any of the SCells being directly activated or hibernated, or
- of up to 5 subframes, if the PCell is in the same band as any of the SCells being directly activated or hibernated;

- an interruption on any activated SCell:
  - of up to 2 subframe, if the activated SCell is not in the same band as any of the SCells being directly activated or hibernated, or
  - of up to 5 subframes, if the activated SCell is in the same band as any of the SCells being directly activated or hibernated.

where *M* is the number of SCells included in the RRC reconfiguration message and shall not exceed the maximum number of SCells supported by the UE.

The interruption shall be within the direct SCell activation and hibernation delay as defined in 7.7.18 and 7.7.19.

# 7.9 Maximum Transmission Timing Difference in Carrier Aggregation

## 7.9.1 Introduction

A UE shall be capable of handling a relative received time difference between the PCell and SCell to be aggregated in inter-band CA and intra-band non-contiguous CA.

## 7.9.2 Minimum Requirements for Interband Carrier Aggregation

The UE shall be capable of handling at least a relative received timing difference between the subframe timing boundaries of the signals received from the PCell and the SCell at the UE receiver of up to 30.26 μs when one SCell is configured.

When two, three, or four SCells are configured, the UE shall be capable of handling at least a relative propagation delay difference between the subframe timing boundaries of the signals received from any pair of the serving cells (PCell and the SCells) at the UE receiver of up to 30.26 μs.

The UE shall be capable of handling a maximum uplink transmission timing difference between the pTAG and the sTAG of at least 32.47μs provided that the UE is:

- configured with inter-band CA and
- configured with the pTAG and the sTAG,

A UE configured with pTAG and sTAG may stop transmitting on the SCell if after timing adjusting due to received TA command the uplink transmission timing difference between PCell and SCell exceeds the maximum value the UE can handle as specified above.

The UE shall be capable of handling a maximum uplink transmission timing difference between the pTAG and any of the two sTAGs or between the two sTAGs of at least 32.47μs provided that the UE is:

- configured with inter-band CA and
- configured with the two sTAGs,

A UE configured with two sTAGs may stop transmitting on the SCell if after timing adjusting due to received TA command the uplink transmission timing difference between SCell in one sTAG and SCell in other sTAG exceeds the maximum value the UE can handle as specified above.

## 7.9.3 Minimum Requirements for Intraband non-contiguous Carrier Aggregation

The UE shall be capable of handling at least a relative received timing difference between the subframe timing boundaries of the signals received from the PCell and the SCell at the UE receiver of up to 30.26 μs.

The UE shall be capable of handling a maximum uplink transmission timing difference between the pTAG and the sTAG of at least 32.47μs provided that the UE is:

- configured with intra-band non-contiguous CA and
- configured with the pTAG and the sTAG,

A UE configured with pTAG and sTAG may stop transmitting on the SCell if after timing adjusting due to received TA command the uplink transmission timing difference between PCell and SCell exceeds the maximum value the UE can handle as specified above.

### 7.9.4 Minimum Requirements for Inter-Band Carrier Aggregation under Frame Structure 3

The UE shall be capable of handling at least a relative received timing difference between the subframe timing boundaries of the signals received from the PCell and the SCell at the UE receiver of up to 30.26 μs when one SCell is configured.

When two or three SCells are configured, the UE shall be capable of handling at least a relative propagation delay difference between the subframe timing boundaries of the signals received from any pair of the serving cells (PCell and the SCells) at the UE receiver of up to 30.26 μs.

## 7.10 Interruptions with RSTD Measurements with Carrier Aggregation

### 7.10.1 Introduction

This section contains the requirements related to the interruptions on PCell and activated SCell if configured, when performing RSTD measurements on cells belonging to at least one SCC with deactivated SCell.

Note: Interruptions during RSTD measurements on PCell and activated SCell if configured may not be required by all UEs.

### 7.10.2 Requirements

When common DRX is used, no interruption is allowed for all carrier aggregation configurations while the On Duration timer is running.

The interruption requirement considers only missed ACK/NACK due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

#### 7.10.2.1 Interruptions during RSTD measurements on SCC for intra-band CA with one downlink SCell

If the UE supports ncsg-r14 and has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

PCell interruptions due to RSTD measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the the PRS periodicity $T_{\text{PRS}}$ is 640 ms or longer. Each interruption shall not exceed 5 subframes.

#### 7.10.2.2 Interruptions during RSTD measurements on SCC for inter-band CA with one downlink SCell

If the UE supports ncsg-r14 and has been configured with NCSG pattern with ID 0,1,2,3, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the UE has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, PCell interruptions due to RSTD measurements on SCC when the SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the PRS periodicity $T_{PRS}$ is 640 ms or longer. Each interruption shall not exceed 1 subframe.

### 7.10.2.3 Interruptions during RSTD measurements on SCC with multiple downlink SCells

If the PCell is not in the same band as any of the SCells being activated or deactivated and if the UE supports ncsg-r14 and has been configured with NCSG pattern with ID 0,1,2,3, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the PCell is not in the same band as any of the SCells being activated or deactivated and if the UE has been configured with gap pattern with ID 0,1 and there is no inter-frequency and inter-RAT frequency layer to be monitored, the UE shall not make any autonomous interruptions outside of the configured gap patterns.

If the PCell is in the same band as any of the SCells being activated or deactivated or if the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, when one SCell is activated and the other SCell is deactivated, then due to RSTD measurements on the SCC with deactivated SCell the UE is allowed:

- an interruption on PCell with up to 0.5% probability of missed ACK/NACK when when the PRS periodicity $T_{PRS}$ is 640 ms or longer. Each interruption shall not exceed:
  - 1 subframe if the PCell is not in the same band as the deactivated SCell
  - 5 subframes if the PCell is in the same band as the deactivated SCell
- an interruption on the activated SCell with up to 0.5% probability of missed ACK/NACK when the PRS periodicity $T_{PRS}$ is 640 ms or longer. Each interruption shall not exceed:
  - 1 subframe if the activated SCell is not in the same band as the deactivated SCell
  - 5 subframes if the activated SCell is in the same band as the deactivated SCell

If the PCell is in the same band as any of the SCells being activated or deactivated or if the UE does not support ncsg-r14 or has not been configured with gap pattern with ID 0,1 or NCSG pattern with ID 0,1,2,3 or the UE has been configured with gap pattern with ID 0,1 to monitor inter-frequency/inter-RAT frequency layers, when both SCells are deactivated, then due to RSTD measurements on one or both SCCs with deactivated SCells the UE is allowed:

- an interruption on PCell with up to 1.0% probability of missed ACK/NACK when the configure PRS periodicity $T_{PRS}$ is 640 ms or longer in any of the SCCs. Each interruption shall not exceed:
  - 1 subframe if the PCell is not in the same band as any of the deactivated SCells
  - 5 subframes if the PCell is in the same band as any of the deactivated SCells

### 7.10.2.4 Interruptions at overlapping RSTD and inter-frequency measurements

If the UE is configured for RSTD measurements on cells belonging to a SCC with deactivated SCell(s) and also with a *measCycleSCell* for performing E-UTRA carrier aggregation measurements as defined in Section 8.3 on the same SCC as configured for the RSTD measurements, then the total allowed interruption on the active serving cell(s) is the maximum of the interruption due to E-UTRA carrier aggregation measurements specified in Section 7.8 and the interruption due to the RSTD measurements on SCC specified in this Section.

# 7.11 Radio Link Monitoring for UE Category 0

## 7.11.1 Introduction

The UE category 0 applicability of the requirements for performing radio link monitoring in subclause 7.11 is defined in Section 3.6.1.

The UE shall monitor the downlink link quality based on the cell-specific reference signal in order to detect the downlink radio link quality of the PCell as specified in [3].

The UE shall estimate the downlink radio link quality and compare it to the thresholds $Q_{out_Cat0}$ and $Q_{in_Cat0}$ for the purpose of monitoring downlink radio link quality of the PCell.

The threshold $Q_{out_Cat0}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical PDCCH transmission taking into account the PCFICH errors with transmission parameters specified in Table 7.11.1-1.

The threshold $Q_{in_Cat0}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out_Cat0}$ and shall correspond to 2% block error rate of a hypothetical PDCCH transmission taking into account the PCFICH errors with transmission parameters specified in Table 7.11.1-2.

**Table 7.11.1-1 PDCCH/PCFICH transmission parameters for out-of-sync for UE category 0**

| Attribute | Value |
|---|---|
| DCI format | 1A |
| Number of control OFDM symbols | 2; Bandwidth ≥ 10 MHz<br>3; 3 MHz ≤ Bandwidth < 10 MHz<br>4; Bandwidth = 1.4 MHz |
| Aggregation level (CCE) | 4; Bandwidth = 1.4 MHz<br>8; Bandwidth ≥ 3 MHz |
| Ratio of PDCCH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell.<br>4 dB: when two or four antenna ports are used for cell-specific reference signal transmission by the PCell. |
| Ratio of PCFICH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell.<br>1 dB: when two or four antenna ports are used for cell-specific reference signal transmission by the PCell. |
| Note 1: DCI format 1A is defined in clause 5.3.3.1.3 in TS 36.212 [21].<br>Note 2: A hypothetical PCFICH transmission corresponding to the number of control symbols shall be assumed. | |

**Table 7.11.1-2 PDCCH/PCFICH transmission parameters for in-sync for UE category 0**

| Attribute | Value |
|---|---|
| DCI format | 1C |
| Number of control OFDM symbols | 2; Bandwidth ≥ 10 MHz<br>3; 3 MHz ≤ Bandwidth < 10 MHz<br>4; Bandwidth = 1.4 MHz |
| Aggregation level (CCE) | 4 |
| Ratio of PDCCH RE energy to average RS RE energy | 1 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell.<br>1 dB; when two or four antenna ports are used for cell-specific reference signal transmission by the PCell. |
| Ratio of PCFICH RE energy to average RS RE energy | 4 dB; when single antenna port is used for cell-specific reference signal transmission by the PCell. |

| | |
|---|---|
| | 1 dB: when two or four antenna ports are used for cell-specific reference signal transmission by the PCell. |
| Note 1: DCI format 1C is defined in clause 5.3.3.1.4 in TS 36.212 [21].<br>Note 2: A hypothetical PCFICH transmission corresponding to the number of control symbols shall be assumed. | |

## 7.11.2 Requirements for FD-FDD and TDD

### 7.11.2.1 Minimum requirement when no DRX is used

When the downlink radio link quality of the PCell estimated over the last 200 ms period becomes worse than the threshold $Q_{out_Cat0}$, Layer 1 of the UE shall send an out-of-sync indication for the PCell to the higher layers within 200ms $Q_{out_Cat0}$ evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last 100 ms period becomes better than the threshold $Q_{in_Cat0}$, Layer 1 of the UE shall send an in-sync indication for the PCell to the higher layers within 100 ms $Q_{in_Cat0}$ evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least 10ms.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

### 7.11.2.2 Minimum requirement when DRX is used

When DRX is used for FD-FDD and TDD category 0 UEs, the $Q_{out_Cat0}$ evaluation period ($T_{Evaluate_Q_{out_DRX_Cat0}}$) and the $Q_{in_Cat0}$ evaluation period ($T_{Evaluate_Q_{in_DRX_Cat0}}$) specified in Table 7.11.2.2-1 will be used.

When eDRX_CONN is used for FD-FDD and TDD category 0 UEs, the $Q_{out_Cat0}$ evaluation period ($T_{Evaluate_Q_{out_DRX_Cat0}}$) and the $Q_{in_Cat0}$ evaluation period ($T_{Evaluate_Q_{in_DRX_Cat0}}$) specified in Table 7.11.2.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_Cat0}}$ [s] period becomes worse than the threshold $Q_{out_Cat0}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_Cat0}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_Cat0}}$ [s] period becomes better than the threshold $Q_{in_Cat0}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_Cat0}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.11.2.2-1: $Q_{out}$ and $Q_{in}$ Evaluation Period in DRX for FD-FDD and TDD UE category 0**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX_Cat0}}$ and $T_{Evaluate_Q_{in_DRX_Cat0}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.11.2.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | Note (20) |

| | |
|---|---|
| 0.04 < DRX cycle ≤ 0. 64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| Note: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.11.2.2-2: $Q_{out}$ and $Q_{in}$ Evaluation Period for FD-FDD and TDD UE category 0 when eDRX_CONN cycle is used**

| eDRX_CONN cycle length [s] | $T_{Evaluate_Q_{out_DRX_Cat0}}$ and $T_{Evaluate_Q_{in_DRX_Cat0}}$ [s] (eDRX_CONN cycles) |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | Note (5) |
| Note: Evaluation period length in time depends on the length of the eDRX_CONN cycle in use | |

### 7.11.2.3 Minimum requirement at transitions

When the UE transitions between any two of DRX, eDRX_CONN, and non-DRX or when DRX or eDRX_CONN cycle periodicity changes, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the PCell.

## 7.11.3 Requirements for HD-FDD

### 7.11.3.1 Minimum requirement when no DRX is used

The HD-FDD category 0 UE shall meet all applicable requirements specified in clause 7.11.2.1 under the following conditions

- at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_Cat0}$ and $Q_{out_Cat0}$ evaluation periods.

### 7.11.3.2 Minimum requirement when DRX is used

When DRX is used for HD-FDD category 0 UEs, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX_Cat0}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX_Cat0}}$) specified in Table 7.11.3.2-1 will be used.

When eDRX_CONN is used for HD-FDD category 0 UEs, the $Q_{out}$ evaluation period ($T_{Evaluate_Q_{out_DRX_Cat0}}$) and the $Q_{in}$ evaluation period ($T_{Evaluate_Q_{in_DRX_Cat0}}$) specified in Table 7.11.3.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_Cat0}}$ [s] period becomes worse than the threshold $Q_{out_Cat0}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_Cat0}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_Cat0}}$ [s] period becomes better than the threshold $Q_{in_Cat0}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_Cat0}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.11.3.2-1: $Q_{out}$ and $Q_{in}$ Evaluation Period in DRX for HD-FDD UE category 0**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX}}$ and $T_{Evaluate_Q_{in_DRX}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.11.2.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | Note (40) |
| 0.04 < DRX cycle ≤ 0. 16 | Note (20) |
| 0. 16 < DRX cycle ≤ 0.64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| Note: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.11.3.2-2: $Q_{out}$ and $Q_{in}$ Evaluation Period for HD-FDD UE category 0 when eDRX_CONN cycle is used**

| eDRX_CONN cycle length [s] | $T_{Evaluate_Q_{out_DRX}}$ and $T_{Evaluate_Q_{in_DRX}}$ [s] (eDRX_CONN cycles) |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | Note (5) |
| Note: Evaluation period length in time depends on the length of the eDRX_CONN cycle in use | |

### 7.11.3.3 Minimum requirement at transitions

The minimum requirements at transitions defined in clause 7.11.2.3 also apply for this section under the following conditions:

at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_Cat0}$ and $Q_{out_Cat0}$ evaluation periods.

# 7.12 Interruptions with Dual Connectivity

## 7.12.1 Introduction

This section contains the requirements related to the interruptions on PCell, PSCell, and SCell, when

PSCell is added or released, or

transitions between active and non-active during DRX, or

transitions from non-DRX to DRX, or

SCell in either MCG or SCG is added or released, or

SCell in either MCG or SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either MCG or SCG, or

SRS carrier based switching.

The requirements shall apply for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD dual connectivity.

## 7.12.2 Requirements

### 7.12.2.1 Interruptions at PSCell addition/release

When a PSCell is added or released as defined in [2] the UE is allowed an interruption of up to 1 subframe on PCell and the activated SCell in MCG if configured during the RRC reconfiguration procedure [2] in synchronous dual connectivity. This interruption is for both uplink and downlink of PCell.

The UE is allowed an interruption of up to 2 subframes on PCell and the activated SCell in MCG if configured during the RRC reconfiguration procedure [2] in asynchronous dual connectivity. This interruption is for both uplink and downlink of PCell.

#### 7.12.2.2 Interruptions at transitions between active and non-active during DRX

When PCell is in non-DRX and PSCell is in DRX, interruptions on PCell and the activated SCell in MCG if configured due to transitions from active to non-active and from non-active to active during PSCell DRX are allowed with up to 1% probability of missed ACK/NACK when the configured PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PSCell DRX cycle is 640 ms or longer. Each interruption shall not exceed 1 subframe.

When PSCell is in non-DRX and PCell is in DRX, interruptions on PSCell on the activated SCell in SCG if configured due to transitions from active to non-active and from non-active to active during PCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed 1 subframe.

When both PCell and PSCell are in DRX, no interruption is allowed.

#### 7.12.2.3 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell in MCG if configured due to PSCell transitions from non-DRX to DRX when PCell is in non-DRX shall not exceed 1subframe.

Interruption on PSCell and the activated SCell in SCG if configured due to PCell transitions from non-DRX to DRX when PSCell is in non-DRX shall not exceed 1subframe.

#### 7.12.2.4 Interruptions at SCell addition/release

The requirements in this clause shall apply for the UE configured with PSCell.

In synchronous dual connectivity, when one SCell is added or released as defined in [2]:

- an interruption on PCell shall meet requirements in clause 7.8.2.7,
- an interruption on PSCell shall meet requirements in clause 7.8.2.7, where the term PCell in clause 7.8.2.7 shall be deemed to be replaced with PSCell.

In asynchronous dual connectivity, when one SCell belonging to MCG is added or released as defined in [2]:

- an interruption on PCell shall meet requirements in clause 7.8.2.7,
- an interruption on PSCell shall meet requirements in clause 7.8.2.7 except for the number of subframe, where the term PCell in clause 7.8.2.7 shall be deemed to be replaced with PSCell. The UE is allowed an interruption on PSCell of up to 2 subframes.

In asynchronous dual connectivity, when one SCell belonging to SCG is added or released as defined in [2]:

- an interruption on PCell shall meet requirements in clause 7.8.2.7 except for the number of subframe. The UE is allowed an interruption on PCell of up to 2 subframes.
- an interruption on PSCell shall meet requirements in clause 7.8.2.7, where the term PCell in clause 7.8.2.7 shall be deemed to be replaced with PSCell.

#### 7.12.2.5 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with PSCell and one SCell.

In synchronous dual connectivity, when one SCell is activated or deactivated as defined in [17]:

- an interruption on PCell shall meet requirements in clause 7.8.2.8,
- an interruption on PSCell shall meet requirements in clause 7.8.2.8, where the term PCell in clause 7.8.2.8 shall be deemed to be replaced with PSCell.

In asynchronous dual connectivity, when one SCell belonging to MCG is activated or deactivated as defined in [17]:

- an interruption on PCell shall meet requirements in clause 7.8.2.8,
- an interruption on PSCell shall meet requirements in clause 7.8.2.8 except for the number of subframe, where the term PCell in clause 7.8.2.8 shall be deemed to be replaced with PSCell. The UE is allowed an interruption on PSCell of up to 2 subframes.

In asynchronous dual connectivity, when one SCell belonging to SCG is activated or deactivated as defined in [17]:

- an interruption on PCell shall meet requirements in clause 7.8.2.8 except for the number of subframe. The UE is allowed an interruption on PCell of up to 2 subframes,
- an interruption on PSCell shall meet requirements in clause 7.8.2.8, where the term PCell in clause 7.8.2.8 shall be deemed to be replaced with PSCell.

### 7.12.2.6 Interruptions during measurements on SCC

The requirements in this clause shall apply for the UE configured with PSCell and one SCell.

In synchronous dual connectivity, when one SCell is deactivated, the UE is allowed due to measurements on the SCC with the deactivated SCell:

- an interruption on PCell shall meet requirements in clause 7.8.2.9,
- an interruption on PSCell shall meet requirements in clause 7.8.2.9, where the term PCell in clause 7.8.2.8 shall be deemed to be replaced with PSCell.

In asynchronous dual connectivity, when one SCell belonging to MCG is deactivated, the UE is allowed due to measurements on the SCC with the deactivated SCell:

- an interruption on PCell shall meet requirements in clause 7.8.2.9,
- an interruption on PSCell shall meet requirements in clause 7.8.2.9 except for the number of subframe, where the term PCell in clause 7.8.2.9 shall be deemed to be replaced with PSCell. The UE is allowed an interruption on PSCell of up to 2 subframes.

In asynchronous dual connectivity, when one SCell belonging to SCG is deactivated, the UE is allowed due to measurements on the SCC with the deactivated SCell:

- an interruption on PCell shall meet requirements in clause 7.8.2.9 except for the number of subframe. The UE is allowed an interruption on PCell of up to 2 subframes
- an interruption on PSCell shall meet requirements in clause 7.8.2.9, where the term PCell in clause 7.8.2.9 shall be deemed to be replaced with PSCell.

### 7.12.2.7 Interruptions at SRS carrier based switching

A PUSCH-less SCC is a TDD SCC without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [16] and/or non-contention based PRACH on a PUSCH-less SCC, the UE can perform carrier based switching to one or more PUSCH-less SCCs from a CC with PUSCH or from another PUSCH-less SCC prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured CC to another activated TDD CC;
- the PUSCH-less SCCs to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [2] for periodic SRS transmission or indicated by PDCCH for PRACH;
- the serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [2];
- the SRS switching is not colliding with any other transmission with higher priority defined in [3];
- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in [3];

- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other CCs.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

The interruption on PCC, PSCC and each of the activated SCCs during the switching to the PUSCH-less SCC shall not exceed 2 subframes including the first subframe where SRS transmission is configured on the PUSCH-less SCC.

The interruption on PCC, PSCC and each of the activated SCCs during the switching from the PUSCH-less SCC shall not exceed 2 subframes including the last subframe where SRS transmission is configured on the PUSCH-less SCC.

# 7.13 Cell phase synchronization accuracy (Synchronized mode of dual connectivity)

## 7.13.1 Definition

Cell phase synchronization accuracy is defined as the maximum absolute timing mismatch between subframes which are transmitted by MeNB and SeNB and are scheduled for the same UE. The cell phase synchronization accuracy is defined only for synchronized mode of dual connectivity operation.

## 7.13.2 Minimum requirements

The cell phase synchronization accuracy shall not exceed the sum of absolute timing accuracy values declared by the manufacturer(s) for each BS. The cell phase synchronization accuracy requirement is optional.

NOTE: The sum of absolute timing accuracy values in synchronized mode of dual connectivity is assumed to be related to MRTD according to the following inequality:

$$T_{CPSA}+T_{RPTD} \leq \text{MRTD at the UE}$$

Where:

$T_{CPSA}$ is the sum of absolute timing accuracy values declared by the manufacturer(s).

$T_{RPTD}$ is the absolute propagation time difference between MeNB and SeNB, which serve the same UE.

MRTD is the Maximum Received Timing Difference at the UE. MRTD is equal to 33 μs.

# 7.14 PSCell Addition and Release Delay for E-UTRA Dual Connectivity

## 7.14.1 Introduction

This section defines requirements for the delay within which the UE shall be able to configure a PSCell in E-UTRA dual connectivity. The requirements are applicable to an E-UTRA dual connectivity capable UE. The requirements shall apply for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD dual connectivity.

## 7.14.2 PSCell Addition Delay Requirement

The requirements in this section shall apply for the UE configured with only PCell.

Upon receiving PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards PSCell no later than in subframe $n+ T_{config_PSCell}$:

Where:

$T_{config_PSCell} = 20ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$

$T_{activation_time}$ is the PSCell activation delay. If the PSCell is known, then $T_{activation_time}$ is 20ms. If the PSCell is unknown, then $T_{activation_time}$ is 30ms provided the PSCell can be successfully detected on the first attempt.

$T_{PCell_DU}$ is the delay uncertainty due to PCell PRACH preamble transmission. $T_{PCell_DU}$ is up to 20ms if PSCell activation is interrupted by a PCell PRACH preamble transmission, otherwise it is 0.

$T_{PSCell_DU}$ is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. $T_{PSCell_DU}$ is up to 30ms.

PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the PSCell configuration command:

- the UE has sent a valid measurement report for the PSCell being configured and
- the PSCell being configured remains detectable according to the cell identification conditions specified in section 8.8,

- PSCell being configured also remains detectable during the PSCell configuration delay according to the cell identification conditions specified in section 8.8.

otherwise it is unknown.The PCell interruption specified in section 7.12 is allowed only during the RRC reconfiguration procedure [2].

The PSCell addition delay specified in this section can be extended if SRS carrier based switching occurs during the PSCell addition procedure.

### 7.14.3 PSCell Release Delay Requirement

The requirements in this section shall apply for a UE configured with PCell and one PSCell.

Upon receiving PSCell release in subframe *n*, the UE shall accomplish the release actions specified in [2] no later than in subframe *n*+20.

The PCell interruption specified in section 7.12 is allowed only during the RRC reconfiguration procedure [2].

The PSCell release delay specified in this section can be extended if SRS carrier based switching occurs during the PSCell release procedure.

## 7.15 Maximum Receive Timing Difference in Dual Connectivity

### 7.15.1 Introduction

A UE shall be capable of handling a relative receive timing difference between subframe timing boundaries of the PCell and PSCell to be aggregated for E-UTRA FDD-FDD, E-UTRA-TDD-TDD, E-UTRA TDD-FDD dual connectivity.

### 7.15.2 Minimum Requirements for Inter-band Dual Connectivity

The UE shall be capable of handling at least a relative receive timing difference between the subframe timing of the signals received from a cell belonging to the MCG and a cell belonging to the SCG at the UE receiver of up to 33 μs provided the UE indicates that it is capable of synchronous dual connectivity [2]. The requirements for synchronous dual connectivity are only applicable for TDD-TDD, FDD-FDD, and TDD-FDD inter-band dual connectivity.

The UE shall be capable of handling at least a relative receive timing difference between the subframe timing of the signals received from a cell belonging to the MCG and a cell belonging to the SCG at the UE receiver of up of 500 μs provided the UE indicates that it is capable of asynchronous dual connectivity [2]. The requirements for asynchronous dual connectivity are only applicable for FDD-FDD inter-band dual connectivity.

The UE shall be capable of handling a relative receive timing difference between the subframe timing of the signals received from any pair of the serving cells belonging to the same cell group according to the requirements in clause 7.9.2.

# 7.16 Proximity-based Services

## 7.16.1 Introduction

The requirements in this clause are applicable for UE performing transmissions and/or reception for ProSe Direct Discovery and/or ProSe Direct Communication in both RRC_IDLE and RRC_CONNECTED state.

## 7.16.2 Requirements

### 7.16.2.1 ProSe UE transmission timing

For ProSe transmission of sidelink channels and signals, UE shall have the capability to follow the timing change of the reference synchronization source.

#### 7.16.2.1.1 Serving cell or PCell as timing reference

The requirements in this subclause are applicable when the reference timing used for ProSe transmissions is the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED). The sidelink transmissions takes place $(N_{\mathrm{TA,SL}} + N_{\mathrm{TAoffset}}) \cdot T_{\mathrm{s}}$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell, where $N_{\mathrm{TA\ offset}}$ is specified in Section 8.1 of [16]. The value of $N_{\mathrm{TA,SL}}$ differs between sidelink channels and signals, and is either $N_{\mathrm{TA,\ SL}} = N_{\mathrm{TA}}$ or $N_{\mathrm{TA,SL}} = 0$ as specified in Section 9.9 of [16].

##### 7.16.2.1.1.1 Requirements when $N_{TA,SL} = 0$

For ProSe transmission of sidelink channels and signals employing $N_{\mathrm{TA,SL}} = 0$, the requirements in Section 7.1 as specified for PRACH transmissions shall apply.

##### 7.16.2.1.1.2 Requirements when $N_{TA,SL} = N_{TA}$

For ProSe transmission of sidelink channels and signals while employing $N_{\mathrm{TA,\ SL}} = N_{\mathrm{TA}}$, the requirements in Section 7.1 as specified for PUSCH shall apply.

When it is the first sidelink transmission in a DRX cycle, the requirements in Section 7.1 as specified for the first PUSCH transmission in a DRX cycle shall apply. The reference point for the UE initial transmit timing control requirement shall be $(N_{\mathrm{TA,\ SL_ref}} + N_{\mathrm{TA\ offset}}) \cdot T_{\mathrm{s}}$ seconds before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. $(N_{\mathrm{TA,\ SL_ref}} + N_{\mathrm{TA\ offset}})$ (in $T_s$ units) for sidelink transmissions is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in Section 7.3 was applied.

When it is not the first sidelink transmission in a DRX cycle or there is no DRX cycle, the requirements as specified in Section 7.1 for PUSCH transmissions when the PUSCH transmission is not the first transmissions in a DRX cycle shall apply.

#### 7.16.2.1.2 SCell or non-serving cell as timing reference

The requirements in this subclause are applicable when the reference timing used for ProSe transmissions is either a SCell (RRC_CONNECTED) or a non-serving cell selected on a non-serving ProSe carrier (RRC_IDLE or RRC_CONNECTED).

The transmission timing requirements are as specified in subclause 7.16.2.1.1, with reference cell as either the SCell or the selected non-serving cell.

## 7.16.3 Interruptions with ProSe

This section contains the requirements related to the interruptions on PCell and activated SCell(s) due ProSe Direct Discovery and ProSe Direct Communication. When ProSe is on a serving cell frequency, then the requirements in this subclause are applicable only to ProSe on E-UTRA FDD bands. When ProSe is on non-serving frequency, then the requirements are applicable to ProSe on both E-UTRA FDD and TDD bands.

When a UE capable of ProSe Direct Communication and/or ProSe Direct Discovery is configured with DRX and DRX is in use, interruptions specified in this section are not allowed while the *onDurationTimer*[17] is running.

Note: ProSe interruption requirements were derived assuming *ShortTTI-r15* is not configured and interruption duration is expected to be shorter in both UL and DL when *ShortTTI-r15* is configured.

### 7.16.3.1 Interruptions at ProSe Direct Discovery configuration

A UE capable of ProSe Direct Discovery may indicate its interest (initiation or termination) in ProSe Direct Discovery to the connected eNodeB using IE *SidelinkUEInformation* [2].

The UE is allowed an interruption of up to 1 subframe on PCell and on any activated SCell during the RRC reconfiguration procedure that includes the ProSe Direct Discovery configuration message *sl-DiscConfig* [2] (setup and release). This interruption is for both uplink and downlink of PCell and activated SCell(s).

### 7.16.3.2 Interruptions at ProSe Direct Communication configuration

A UE capable of ProSe Direct Communication may indicate its interest (initiation or termination) in ProSe Direct Communication to the connected eNodeB using IE *SidelinkUEInformation* [2].

The UE is allowed an interruption of up to 1 subframe on PCell and on any activated SCell during the RRC reconfiguration procedure that includes the ProSe Direct Communication configuration message *sl-CommConfig* [2] (setup and release). This interruption is for both uplink and downlink of PCell and activated SCell(s).

### 7.16.3.3 Interruptions during ProSe Direct Discovery

When ProSe Direct Discovery operation is on a serving cell (PCell/SCell) and when no request for transmission and/or reception gaps are signalled by the ProSe UE, the UE is allowed an interruption of up to 1 subframe that is *N* subframes before and after a UL subframe configured for ProSe Direct Discovery by a serving eNodeB. For discovery period less than 320ms, the allowed interruptions are additionally limited up to 0.625%.

The value of *N* is *ceil(w1 /* 1ms*)* subframes when the parameter *discSyncWindow*[2] is configured with value *w1* in the sidelink synchronization resource configuration associated with the ProSe Direct Discovery subframe.

The value of *N* is 1 subframe otherwise.

When ProSe Direct Discovery is on a non-serving carrier, and when no request for transmission and/or reception gaps is signalled by the UE, interruptions to serving cell(s) is allowed with up to $min\left(0.5\%, \frac{6}{discPeriod(ms)} \times 100\%\right)$ probability of missed ACK/NACK. Furthermore, when ProSe Direct Discovery is on more than one non-serving carrier, and no request for transmission and/or reception gaps is signalled by the UE, the aggregate interruptions to serving cells(s) are allowed with up to $\min\left(2\%, \sum_{i=1}^{N} \min\left(0.5\%, \frac{6}{discPeriod_i(ms)} \times 100\%\right)\right)$ probability of missed ACK/NACK with *N* non-serving carriers.

The interruptions are for both uplink and downlink of PCell and any activated SCell. The interruption for the ProSe UE may occur:

- while switching a receiver chain ON/OFF for ProSe Direct Discovery if the UE has a dedicated receiver chain for discovery, and/or

- while switching a transmitter chain ON/OFF for ProSe Direct Discovery transmissions on a non-serving carrier, and if the UE has a dedicated transmitted chain for discovery.

### 7.16.3.4 Interruptions during ProSe Direct Discovery with discovery gaps

When ProSe Direct Discovery is either on a serving cell (PCell/SCell) or a non-serving frequency, and when discovery reception and/or transmission gaps are configured by the serving cell, then only the following interruptions to the PCell and any activated SCell(s) are allowed:

- Uplink interruption is allowed on a subframe configured as downlink reception gap (using *discRxGapConfig*) if either the subframe immediately preceding or immediately following that subframe is not configured as reception gap; and,

- If ProSe Direct Discovery is on a non-serving FDD carrier and that carrier is used for ProSe synchronization, then uplink interruption is additionally allowed on 1 subframe in a discovery period. The interrupted subframe(s) shall be within the subframes configured as reception gap using *discRxGapConfig*; and,

- If ProSe Direct Discovery transmissions are on carrier that is not configured for uplink, then UE is allowed to additionally interrupt the serving cell(s) on up to 2 subframes for each discovery/SLSS transmission configured in a discovery period. The interrupted subframe(s) shall be within the subframes configured as transmission gaps using *discTxGapConfig*.

NOTE: The request and grant of discovery gaps is left up to UE and eNodeB implementations, respectively. When ProSe Direct Discovery is on a non-serving carrier and that carrier is used for ProSe synchronization, then the UE requested / eNodeB configured gaps may depend if inter-frequency measurements are additionally configured for that non-serving frequency.

### 7.16.3.5 Interruptions during ProSe Direct Communication

When ProSe Direct Communication is on a non-serving carrier and the PCell is not broadcasting SIB18, then interruptions to serving cell(s) is allowed with up to 0.5% probability of missed ACK/NACK. Furthermore, when ProSe Direct Communication is on more than one non-serving carrier, the aggregate interruptions to serving cell(s) is allowed with up to *min*(2%, 0.5%×*N*) probability of missed ACK/NACK with *N* non-serving carriers.

The interruptions are for both uplink and downlink of PCell and any activated SCell.

## 7.16.4 Cell reselection for ProSe Direct Discovery on non-serving frequency

The requirements in this subclause apply when ProSe Direct Discovery transmissions are configured on a non-serving carrier and that non-serving carrier is used for downlink synchronziation and measurements for ProSe Direct Discovery transmission, and provided the parameters required for cell selection / reselection are provided by the serving cell using *discCellSelectionInfo*.

NOTE: The requirements do not apply if the UE is required to acquire the cell selection/reselection parameters that are broadcast from the concerned cell for evaluation.

If the UE signals request for transmission and/or reception gaps, then the requirements apply if the gaps are configured as requested by the UE.

### 7.16.4.1 Measurement and evaluation of selected cell

The UE shall measure the RSRP and RSRQ level of the selected reference cell on the non-serving carrier used for ProSe Direct Discovery synchronization and evaluate the cell selection criterion S defined in [1] for the selected cell at least every discovery period.

The UE shall filter the RSRP and RSRQ measurements of the selected cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least discPeriod / 2.

### 7.16.4.2 Measurement of intra-frequency E-UTRAN cells

The UE shall be able to identify new intra-frequency cells on the non-serving carrier used for ProSe Direct Discovery transmission and perform RSRP and RSRQ measurements of identified intra-frequency cells.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS36.304 [1, 11.4] within $T_{detect,EUTRAN_ProSe_Intra}$ when $T_{reselection} = 0$ (within *discCellSelectionInfo*). An intra frequency cell is considered to be detectable according to RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot defined in Annex B.1.1 for a corresponding Band.

The UE shall measure RSRP and RSRQ at least every $T_{measure,EUTRAN_ProSe_Intra}$ (see table 7.16.4.2-1) for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter RSRP and RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN_ProSe_Intra}/2$

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{evaluate,E\text{-}UTRAN_ProSe_Intra}$ when $T_{reselection} = 0$ (within *discCellSelectionInfo*) as specified in table 7.16.4.2-1 provided that the cell is at least 3dB better ranked. When evaluating cells for reselection, the side conditions for RSRP and SCH apply to both the non-serving cell that is currently selected and the non-serving cell being reselected to for ProSe Direct Discovery synchronization.

If $T_{reselection}$ timer (within *discCellSelectionInfo*) has a non-zero value and the intra-frequency cell being reselected to is better ranked than the currently selected reference cell, the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

**Table 7.16.4.2-1: $T_{detect,EUTRAN_ProSe_Intra}$, $T_{measure,EUTRAN_ProSe_Intra}$ and $T_{evaluate,\ E\text{-}UTRAN_ProSe_Intra}$**

| Discovery Period [s] | $T_{detect,EUTRAN_ProSe_Intra}$ (number of discovery periods) | $T_{measure,EUTRAN_ProSe_Intra}$ (number of discovery periods) | $T_{evaluate,E\text{-}UTRAN_ProSe_Intra}$ (number of discovery periods) |
|---|---|---|---|
| Discovery Period≤0.32 | Note 1 (36) | Note 1 (4) | Note 1 (16) |
| 0.32<Discovery Period≤0.64 | Note 1 (28) | Note 1 (2) | Note 1 (8) |
| 0.64<Discovery Period≤1.28 | Note 1 (25) | Note 1 (1) | Note 1 (5) |
| 1.28<Discovery Period≤10.24 | Note 1 (23) | Note 1 (1) | Note 1 (3) |
| NOTE 1: Time depends upon the configured Discovery period. | | | |

## 7.16.5 Selection / Reselection of ProSe relay UE

This subclause contains the requirements related to selection and reselection of ProSe relay UE if the serving frequency is used for ProSe Direct Communication via a ProSe relay UE.

For a remote UE configured by upper layer for relay operation, when the RSRP measurement of the serving cell (RRC_IDLE) or the PCell (RRC_CONNECTED) is below *threshHigh* (within *remoteUE-Config*), the remote UE shall search for candidate relay UEs for selection and/or reselection every discovery period.

If the remote UE has a selected sidelink relay UE, then the remote UE shall measure the SD-RSRP of the selected relay once in every four discovery periods and evaluate if it meets the relay selection criterion as defined in [TS 36.331, 5.10.11.4].

The remote UE shall measure SD-RSRP of the candidate relay UEs every $T_{measure,\ ProSe_Relay_Intra}$ for intra-frequency relay UEs that are detected and measured according to the measurement rules.

For an intra-frequency relay UEs that are detected, but that has not been selected or reselected to, the remote UE shall be capable of evaluating that the intra-frequency relay UE has met selection or reselection criterion defined in [2, 5.10.11.4] within $T_{evaluate,ProSe_Relay_Intra}$ as specified in table 7.16.5-1.

The minimum requirements are required to meet when the selected and candidate relay UEs are transmitting relay discovery message every discovery period.

**Table 7.16.5-1: $T_{measure,\ ProSe_Relay_Intra}$ and $T_{evaluate,\ ProSe_Relay_intra}$**

| Discovery Period [s] | $T_{measure,ProSe_Relay_Intra}$ [s] (number of discovery periods) | $T_{evaluate,\ ProSe_Relay_intra}$ [s] (number of discovery periods) |
|---|---|---|
| 0.04≤Discovery period≤10.24 | Note 1 (4) | Note 1 (16) |
| NOTE 1: Time depends upon the configured Discovery period. | | |

## 7.16.6 ProSe operation under deactivated SCell

If the UE is configured for ProSe operation on a sidelink of an SCell then UE is allowed to perform ProSe operation on the sidelink of that SCell regardless of whether that SCell is activated or deactivated provided that there is no addional interruptions beyond what is specified in section 7.8.

# 7.17 Maximum Transmission Timing Difference in Dual Connectivity

## 7.17.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundaries of the PCell and PSCell to be aggregated for E-UTRA FDD-FDD, E-UTRA-TDD-TDD, E-UTRA TDD-FDD dual connectivity.

## 7.17.2 Minimum Requirements for maximum transmission timing difference Inter-band Dual Connectivity

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell of at least 35.21 μs provided the UE indicates that it is capable of synchronous dual connectivity [2]. The requirements for synchronous dual connectivity are only applicable for TDD-TDD, FDD-FDD, and TDD-FDD inter-band dual connectivity.

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell of at least 500 μs provided the UE indicates that it is capable of asynchronous dual connectivity [2]. The requirements for asynchronous dual connectivity are only applicable for FDD-FDD and inter-band dual connectivity.

If the UE is configured with higher layer parameter powerControlMode<1>, then the UE may stop transmission on the PSCell if the UL transmission timing difference exceeds 35.21μs. If a UE supports both synchronous and asynchronous dual connectivity and if the UE is configured with higher layer parameter powerControlMode<2>, then the UE needs to constitute new subframes pair if the UL transmission timing difference exceeds 500μs.7.18 SCell Activation and Deactivation Delay for E-UTRA Dual Connectivity

## 7.18.1 Introduction

This section defines requirements for the delay within which the UE shall be able to activate a deactivated SCell and deactive an activated SCell in E-UTRA dual connectivity. The requirements are applicable to an E-UTRA dual connectivity capable UE which has been configured with one SCell in either MCG or SCG and PSCell. In case where the SCell belongs to SCG, the term PCell in clause 7.7 shall be replaced with PSCell. The requirements shall apply for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD dual connectivity.

## 7.18.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for a UE configured with PSCell and one SCell.

The SCell activation delay shall meet the requirements in clause 7.7.2.

## 7.18.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this clause shall apply for a UE configured with PSCell and one SCell.

The SCell deactivation delay shall meet the requirements in clause 7.7.3.

# 7.19 Radio Link Monitoring for UE Category M1

## 7.19.1 Introduction

The UE category M1 applicability of the requirements for performing radio link monitoring in subclause 7.19 is defined in Section 3.6.

All the requirements in Section 7.19 apply, provided that:

- the UE is not configured with any of the measurement gap patterns defined in Table 8.1.2.1-3, or
- the UE is configured with a measurement gap pattern for RSTD measurements specified in Table 8.1.2.1-3 and there is no overlap between these measurement gaps and configured MPDCCH subframes for UE monitoring.

If the UE is configured with a measurement gap pattern for RSTD measurements specified in Table 8.1.2.1-3 and there is overlap between these measurement gaps and configured MPDCCH subframes for UE monitoring, the UE shall also perform RLM according to Section 7.19, but the out-of-sync evaluation period ($T_{Evaluate_Q_{out_CatM1}}$) and in-sync evaluation periods can be longer than those defined in 7.19.

The UE shall monitor the downlink link quality based on the cell-specific reference signal in order to detect the downlink radio link quality of the PCell as specified in TS 36.213 [3].

## 7.19.2 Requirements for FD-FDD and TDD CE mode A

The requirements defined in this subclause 7.19.2 for performing radio link monitoring are applicable for UE category M1 defined in Section 3.6.

The UE shall estimate the downlink radio link quality and compare it to the thresholds $Q_{out_Cat\ M1}$ and $Q_{in_Cat\ M1}$ for the purpose of monitoring downlink radio link quality of the PCell.

The threshold $Q_{out_Cat\ M1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-1.

The threshold $Q_{in_Cat\ M1}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out_Cat\ M1}$ and shall correspond to 2% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-1.

**Table 7.19.2-1 M-PDCCH transmission parameters for out-of-sync and in-sync for UE category M1 with CE mode A**

| Attribute | Out-of-sync | In-sync |
|---|---|---|
| DCI format | 6-1A | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum M-PDCCH repetition level | $R_{max}$ Note1 | $R_{max}$ /2 Note1 |
| Aggregation level (ECCE) | $L'_{max}$ Note2 | $L'_{max-2}$ Note2 |
| M-PDCCH Transmission type | Distributed | Distributed |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}$>1.<br>NOTE 2: $L'_{max}$ and $L'_{max-2}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. $L'_{max-2}$ is the aggregation level two levels below $L'_{max}$, and $L'_{max-2}$ is 8, 4 and 2, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | | |

In addition to the requirements defined above, UE configured with *rlm-ReportConfig* has to

- Estimate the downlink radio link quality and compare it to the thresholds $Q_{E1_out_CatM1}$ and $Q_{E2_in_CatM1}$ for the purpose of monitoring downlink radio link quality of the PCell.

The threshold $Q_{E1_out_CatM1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-2.

The threshold $Q_{E2_in_CatM1}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{E1_out_CatM1}$ and shall correspond to 2% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-2.

**Table 7.19.2-2 M-PDCCH transmission parameters for event E1 and event E2 for UE category M1 with CE mode A**

| Attribute | Event E1 | Event E2 |
|---|---|---|
| DCI format | 6-1A | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum M-PDCCH repetition level | Rmax/2 Note1 | Rmax/8 Note1 |
| Aggregation level (ECCE) | $L'_{max-1}$ Note2 | $L'_{max-2}$ Note2 |
| M-PDCCH Transmission type | Distributed | Distributed |

NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max} \geq 2$ to trigger Event E1 and $R_{max} \geq 8$ to trigger Event E2.
NOTE 2: $L'_{max-1}$ and $L'_{max-2}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max-1}$ is 16, 8 and 4, if *numberPRB-Pairs* is 6, 4 and 2, respectively. $L'_{max-2}$ is the aggregation level one level below $L'_{max-1}$, and $L'_{max-2}$ is 8, 4 and 2, if *numberPRB-Pairs* is 6, 4 and 2, respectively.

For a UE configured with *mpdcch-crs-connected-config*, threshold $Q_{out_Cat\ M1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-3, provided:

- Out-of-sync indication is triggered in the UE.

**Table 7.19.2-3 MPDCCH transmission parameters for Out-of-sync for UE category M1 with CE mode A configured with *mpdcch-crs-connected-config***

| Attribute | Out-of-sync |
|---|---|
| DCI format | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum MPDCCH repetition level | $R_{max}$ Note1 |
| Aggregation level (ECCE) | $L'_{max}$ Note2 |
| MPDCCH Transmission type | Distributed |
| Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}>1$ to trigger Out-of-snych.<br>NOTE 2: $L'_{max}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | |

For a UE configured with *mpdcch-crs-connected-config*, threshold $Q_{E1_out_CatM1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-4, provided

- Early-out-of-sync is triggered in the UE

**Table 7.19.2-4 MPDCCH transmission parameters for early Out-of-sync for UE category M1 with CE mode A configured with *mpdcch-crs-connected-config***

| Attribute | Event E1 |
|---|---|
| DCI format | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum MPDCCH repetition level | $R_{max}/2$ Note1 |
| Aggregation level (ECCE) | $L'_{max-1}$ Note2 |
| MPDCCH Transmission type | Distributed |
| Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}>1$ to trigger Out-of-snych.<br>NOTE 2: $L'_{max}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | |

### 7.19.2.1 Minimum requirement when no DRX is used

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_CatM1}}$ period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send an out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_CatM1}}$ evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_CatM1}}$ period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send an in-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{in_CatM1}}$ evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least max(10ms, $r_{max}$*G).

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

$T_{Evaluate_Q_{out_CatM1}} = 5*r_{max}*G$ ms and $T_{Evaluate_Q_{in_CatM1}} = 5*r_{max}*G$ ms, provided the below conditions are met, where $r_{max}*G$ is MPDCCH monitoring cycle length and parameters $r_{max}$ and $G$ are as specified in [3]:

$r_{max}*G \geq 80$ ms, and

$G>1$, and

UE is not receiving PDSCH,

otherwise $T_{Evaluate_Q_{out_CatM1}} = 400$ ms and $T_{Evaluate_Q_{in_CatM1}} = 200$ ms.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $Q_{out_CatM1}$ evaluation period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period. A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].
- When the downlink radio link quality of the PCell estimated over the last $Q_{in_CatM1}$ period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period. A L3 filter shall be applied to the event E2 indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.2.1-1.

**Table 7.19.2.1-1: Reportable values of *excessRep-MPDCCH***

| Parameter: excessRep-MPDCCH-r14 | Value |
|---|---|
| 'excessRep1' | 2 Note1 |
| 'excessRep2' | 4 Note1 |
| NOTE 1: excessRep-MPDCCH-r14 is the factor by which UE recommends eNB to scale down $R_{max}$ (as per the formula $R_{max}$ / excessRep-MPDCCH-r14), where $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331. | |

## 7.19.2.2 Minimum requirement when DRX is used

The requirements in this section apply regardless of the MPDCCH search space and parameter G [3] configuration.

When DRX is used for FD-FDD and TDD UE category M1 UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.2.2-1 will be used.

When eDRX_CONN cycle is used for FD-FDD and TDD UE category M1 UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.2.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.19.2.2-1: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ Evaluation Period in DRX for FD-FDD and TDD UE category M1**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.19.2.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | Note (20) |
| 0.04 < DRX cycle ≤ 0. 64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.19.2.2-2: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ evaluation period when eDRX_CONN cycle is configured for FD-FDD and TDD UE category M1**

| eDRX_CONN cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the eDRX_CONN cycle in use | |

The requirements defined in clause 7.19.2.2 also apply for this section.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the E2 event indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.2.1-1.

### 7.19.2.3 Minimum requirement at transitions

When the UE transitions between any two of DRX, eDRX_CONN and non-DRX or when DRX or eDRX_CONN cycle periodicity changes, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period

corresponding to the second mode. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the PCell.

## 7.19.3 Requirements for HD-FDD with CE mode A

The requirements defined in this subclause 7.19.3 for performing radio link monitoring are applicable for UE category M1 defined in Section 3.6.

### 7.19.3.1 Minimum requirement when no DRX is used

The HD-FDD category M1 with CE mode A UE shall meet all applicable requirements specified in clause 7.19.2.1 under the following conditions

- at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_CatM1}$ and $Q_{out_CatM1}$ evaluation periods.

### 7.19.3.2 Minimum requirement when DRX is used

The requirements in this section apply regardless of the MPDCCH search space and parameter G [3] configuration.

When DRX is used for HD-FDD category M1 with CE mode A UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.3.2-1 will be used.

When eDRX_CONN cycle is used for HD-FDD category M1 with CE mode A UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.3.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.19.3.2-1: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ Evaluation Period in DRX for HD-FDD UE category M1 with CE mode A**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.01 | Non-DRX requirements in clause 7.19.3.1 are applicable. |
| 0.01 < DRX cycle ≤0.04 | Note (40) |
| 0.04 < DRX cycle ≤ 0. 16 | Note (20) |
| 0. 16 < DRX cycle ≤ 0.64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| Note: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.19.3.2-2: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ evaluation period when eDRX_CONN cycle is configured for HD-FDD UE category M1 with CE mode A**

| eDRX_CONN cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the eDRX_CONN cycle in use | |

The requirements defined in clause 7.19.3.2 also apply for this section.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the E2 event indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.2.1-1.

### 7.19.3.3 Minimum requirement at transitions

The minimum requirements at transitions defined in clause 7.19.2.3 also apply for this section under the following conditions:

- at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_CatM1}$ and $Q_{out_CatM1}$ evaluation periods.

## 7.19.4 Requirements for FD-FDD and TDD with CE mode B

The requirements defined in this subclause 7.19.4 for performing radio link monitoring are applicable for UE category M1 defined in Section 3.6.

The UE shall estimate the downlink radio link quality and compare it to the thresholds $Q_{out_Cat\ M1}$ and $Q_{in_Cat\ M1}$ for the purpose of monitoring downlink radio link quality of the PCell.

The threshold $Q_{out_Cat\ M1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-1.

The threshold $Q_{in_Cat\ M1}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out_Cat\ M1}$ and shall correspond to 2% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-1.

**Table 7.19.4-1 M-PDCCH transmission parameters for out-of-sync and in-sync for UE category M1 with CE mode B**

| Attribute | Out-of-sync | In-sync |
|---|---|---|
| DCI format | 6-1B | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum M-PDCCH repetition level | $R_{max}$ Note1 | $R_{max}/2$ Note1 |
| Aggregation level (ECCE) | $L'_{max}$ Note2 | $L'_{max-2}$ Note2 |
| M-PDCCH Transmission type | Distributed | Distributed |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}$>1. | | |

NOTE 2: $L'_{max}$ and $L'_{max-2}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. $L'_{max-2}$ is the aggregation levels two levels below $L'_{max}$, and $L'_{max-2}$ is 8, 4 and 2, if *numberPRB-Pairs* is 6, 4 and 2, respectively.

In addition, a UE configured with *rlm-ReportConfig* has to meet the following requirements

- Estimate the downlink radio link quality and compare it to the thresholds $Q_{E1_out_CatM1}$ and $Q_{E2_in_CatM1}$.

The threshold $Q_{E1_out_CatM1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-2.

The threshold $Q_{E2_in_Cat\ M1}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out_Cat\ M1}$ and shall correspond to 2% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-2.

**Table 7.19.4-2 M-PDCCH transmission parameters for event E1 and event E2 for UE category M1 with CE mode B**

| Attribute | Event E1 | Event E2 |
|---|---|---|
| DCI format | 6-1B | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum M-PDCCH repetition level | Rmax/2 Note1 | Rmax/8 Note1 |
| Aggregation level (ECCE) | $L'_{max-1}$ Note2 | $L'_{max-2}$ Note2 |
| M-PDCCH Transmission type | Distributed | Distributed |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max} \geq 2$ to trigger Event E1 and $R_{max} \geq 8$ to trigger Event E2.<br>NOTE 2: $L'_{max-1}$ and $L'_{max-2}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max-1}$ is 16, 8 and 4, if *numberPRB-Pairs* is 6, 4 and 2, respectively. $L'_{max-2}$ is the aggregation level one levels below $L'_{max-1}$, and $L'_{max-2}$ is 8, 4 and 2, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | | |

For a UE configured with *mpdcch-crs-connected-config*, the threshold $Q_{out_Cat\ M1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-3, provided:

- Out-of-sync indication is triggered in the UE.

**Table 7.19.4-3 MPDCCH transmission parameters for Out-of-sync for UE category M1 with CE mode B configured with *mpdcch-crs-connected-config***

| Attribute | Out-of-sync |
|---|---|
| DCI format | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum MPDCCH repetition level | $R_{max}$ Note1 |
| Aggregation level (ECCE) | $L'_{max}$ Note2 |
| MPDCCH Transmission type | Distributed |
| Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}>1$ to trigger Out-of-snych.<br>NOTE 2: $L'_{max}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | |

For a UE configured with *mpdcch-crs-connected-config*, the threshold $Q_{E1_out_CatM1}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.4-4, provided

- Early-out-of-sync is triggered in the UE

**Table 7.19.4-4 MPDCCH transmission parameters for early Out-of-sync for UE category M1 with CE mode B configured with *mpdcch-crs-connected-config***

| Attribute | Event E1 |
|---|---|
| DCI format | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| Maximum MPDCCH repetition level | $R_{max}/2$ Note1 |
| Aggregation level (ECCE) | $L'_{max-1}$ Note2 |
| MPDCCH Transmission type | Distributed |
| Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB |
| NOTE 1: $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and $R_{max}$>1 to trigger Out-of-snych.<br>NOTE 2: $L'_{max}$ is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. $L'_{max}$ is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | |

### 7.19.4.1 Minimum requirement when no DRX is used

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_CatM1}}$ period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send an out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_CatM1}}$ evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_CatM1}}$ period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send an in-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{in_CatM1}}$ evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least max(10ms, $r_{max}$*G).

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

$T_{Evaluate_Q_{out_CatM1}} = 5*r_{max}*G$ ms and $T_{Evaluate_Q_{in_CatM1}} = 5*r_{max}*G$ ms, provided the below conditions are met, where $r_{max}*G$ is MPDCCH monitoring cycle length and parameters $r_{max}$ and $G$ are as specified in [3]:

$r_{max}*G \geq 800$ ms, and

$G$>1, and

UE is not receiving PDSCH,

otherwise $T_{Evaluate_Q_{out_CatM1}} = 4000$ ms and $T_{Evaluate_Q_{in_CatM1}} = 2000$ m

The requirements defined in clause 7.19.4.1 also apply for this section.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $Q_{out_CatM1}$ evaluation period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].
- When the downlink radio link quality of the PCell estimated over the last $Q_{in_CatM1}$ evaluation period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period. A L3 filter shall be applied to the E2 event indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.4.1-1.

**Table 7.19.4.1-1: Reportable values of *excessRep-MPDCCH***

| Parameter: excessRep-MPDCCH-r14 | Value |
|---|---|
| 'excessRep1' | 2 Note1 |

| | |
|---|---|
| 'excessRep2' | 4 Note1 |
| NOTE 1: excessRep-MPDCCH-r14 is the factor by which UE recommends eNB to scale down $R_{max}$ (as per the formula $R_{max}$ / excessRep-MPDCCH-r14), where $R_{max}$ is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331. | |

### 7.19.4.2 Minimum requirement when DRX is used

The requirements in this section apply regardless of the MPDCCH search space and parameter G [3] configuration.

When DRX is used for FD-FDD and TDD UE category M1 UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.4.2-1 will be used.

When eDRX_CONN cycle is used for FD-FDD and TDD UE category M1 UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.4.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.19.4.2-1: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ Evaluation Period in DRX for FD-FDD and TDD UE category M1**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.16 | Non-DRX requirements in clause 7.19.4.1 are applicable. |
| 0.160 < DRX cycle ≤ 0.320 | Note (20) |
| 0.320 < DRX cycle ≤ 0. 64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.19.4.2-2: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ evaluation period when eDRX_CONN cycle is configured for FD-FDD and TDD UE category M1**

| eDRX_CONN cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56 < eDRX_CONN cycle ≤ 10.24 | Note (5) |

| NOTE: | Evaluation period length in time depends on the length of the eDRX_CONN cycle in use |
|---|---|

The requirements defined in clause 7.19.4.2 also apply for this section.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the E2 event indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.4.1-1.

### 7.19.4.3 Minimum requirement at transitions

When the UE transitions between any two of DRX, eDRX_CONN and non-DRX or when DRX or eDRX_CONN cycle periodicity changes, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the PCell.

## 7.19.5 Requirements for HD-FDD with CE mode B

The requirements defined in this subclause 7.19.5 for performing radio link monitoring are applicable for UE category M1 defined in Section 3.6.

### 7.19.5.1 Minimum requirement when no DRX is used

The HD-FDD category M1 with CE mode B UE shall meet all applicable requirements specified in clause 7.19.4.1 under the following conditions

- at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_CatM1}$ and $Q_{out_CatM1}$ evaluation periods.

### 7.19.5.2 Minimum requirement when DRX is used

The requirements in this section apply regardless of the MPDCCH search space and parameter G [3] configuration.

When DRX is used for HD-FDD category M1 with CE mode B UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.5.2-1 will be used.

When eDRX_CONN cycle is used for HD-FDD category M1 with CE mode B UEs, the $Q_{out_CatM1}$ evaluation period ($T_{Evaluate_Q_{out_DRX_CatM1}}$) and the $Q_{in_CatM1}$ evaluation period ($T_{Evaluate_Q_{in_DRX_CatM1}}$) specified in Table 7.19.5.2-2 will be used.

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{out_CatM1}$, Layer 1 of the UE shall send out-of-sync indication for the PCell to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{in_CatM1}$, Layer 1 of the UE shall send in-sync indications for the PCell to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the PCell shall be performed as specified in clause 4.2.1 in [3]. When DRX is used, two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length). When eDRX_CONN is used, two successive indications from Layer 1 shall be separated by at least max(10 ms, eDRX_CONN cycle length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.19.5.2-1: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ Evaluation Period in DRX for HD-FDD UE category M1 with CE mode B**

| DRX cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.08 | Non-DRX requirements in clause 7.19.5.1 are applicable. |
| 0.08< DRX cycle ≤0.160 | Note (40) |
| 0.160 < DRX cycle ≤ 0.320 | Note (20) |
| 0.320 < DRX cycle ≤ 0.64 | Note (10) |
| 0.64 < DRX cycle ≤ 2.56 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the DRX cycle in use | |

**Table 7.19.5.2-2: $Q_{out_CatM1}$ and $Q_{in_CatM1}$ evaluation period when eDRX_CONN cycle is configured for HD-FDD UE category M1 with CE mode B**

| eDRX_CONN cycle length (s) | $T_{Evaluate_Q_{out_DRX_CatM1}}$ and $T_{Evaluate_Q_{in_DRX_CatM1}}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56 < DRX cycle ≤ 10.24 | Note (5) |
| NOTE: Evaluation period length in time depends on the length of the eDRX_CONN cycle in use | |

The requirements defined in clause 7.19.5.2 also apply for this section.

A UE configured with *rlm-ReportConfig* has to additionally meet the following requirements

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] period becomes worse than the threshold $Q_{E1_out_CatM1}$, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $T_{Evaluate_Q_{out_DRX_CatM1}}$ [s] evaluation period. A Layer 3 filter shall be applied to the E1 event indications as specified in TS 36.331 [2].

- When the downlink radio link quality of the PCell estimated over the last $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] period becomes better than the threshold $Q_{E2_in_CatM1}$, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $T_{Evaluate_Q_{in_DRX_CatM1}}$ [s] evaluation period. A L3 filter shall be applied to the E2 event indications as specified in TS 36.331 [2]. The UE may also include the excess number of repetitions in the reported event report using the RRC parameter *excessRep-MPDCCH* as defined in TS 36.331 [2]. The reportable values of *excessRep-MPDCCH* are defined in Table 7.19.4.1-1.

### 7.19.5.3 Minimum requirement at transitions

The minimum requirements at transitions defined in clause 7.19.4.3 also apply for this section under the following conditions:

- at least 1 DL subframe per radio frame of PCell is available at the UE during $Q_{in_CatM1}$ and $Q_{out_CatM1}$ evaluation periods.

# 7.20 UE transmit timing for NB-IoT

## 7.20.1 Introduction

The Category NB1 UE shall have capability to follow the frame timing change of the connected eNode B. The uplink frame transmission takes place $(N_{\text{TA_Ref}}+N_{\text{TAoffset}})\times T_s$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference NB-IoT cell.

UE shall use the serving NB-IoT cell as the reference cell for deriving the UE transmit timing. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements.

## 7.20.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 7.20.2-1. This requirement applies when it is the first transmission in a DRX cycle or the first transmission in a repetition period (R>1) for NPUSCH and NPRACH, the first transmission after an uplink transmission gap in a repetition period (R>1) for NPUSCH and NPRACH transmission, or it is the transmission on PUR. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the serving NB-IoT cell minus $(N_{\text{TA_Ref}}+N_{\text{TAoffset}})\times T_s$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the serving NB-IoT cell. $N_{\text{TA_Ref}}$ for NPRACH is defined as 0. $(N_{\text{TA_Ref}}+N_{\text{TAoffset}})$ (in $T_s$ units) for other channels is the difference between UE transmission timing and the Downlink timing immediately after when the last timing advance in clause 7.22 was applied. $N_{\text{TA_Ref}}$ for other channels is not changed until next timing advance is received.

**Table 7.20.2-1: $T_e$ Timing Error Limit**

| Downlink Bandwidth (MHz) | $T_{e_}$ |
|---|---|
| 0.18 | 80*$T_S$ |
| Note 1: $T_S$ is the basic timing unit defined in TS 36.211 | |

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for NPUSCH the UE shall, when no repetitions are configured on the uplink or the repetition period is R=1, be capable of changing the transmission timing according to the received downlink frame of the serving NB-IoT cell except when the timing advance in clause 7.22 is applied such that the UE transmission timing error shall be less than or equal to $\pm T_e$, where the timing error limit value $T_e$ is specified in Table 7.20.2-1.

When no repetition period is configured, or the configured repetition period is R=1, all adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be 58.33*$T_S$ seconds.
2) The minimum aggregate adjustment rate shall be 7*$T_S$ per second.
3) The maximum aggregate adjustment rate shall be 58.33*$T_S$ per 200ms.

When a repetition period is configured on the uplink for which R>1, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission as defined above.

# 7.21 UE timer accuracy for NB-IoT

## 7.21.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

## 7.21.2 Requirements

For UE timers specified in TS 36.331 [2], UE shall comply with the timer accuracies according to Table 7.21.2-1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. TTI alignment when UE sends messages at timer expiry).

**Table 7.21.2-1**

| Timer value [s] | Accuracy |
|---|---|
| timer value < 4 | ± 0.1s |
| timer value ≥ 4 | ± 2.5% |

# 7.22 Timing Advance for NB-IoT

## 7.22.1 Introduction

The timing advance is initiated from E-UTRAN with MAC message that implies and adjustment of the timing advance, see TS 36.321 [17] clause 5.2.

## 7.22.2 Requirements

### 7.22.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at sub-frame *n*+12 for a timing advance command received in sub-frame *n*. In case repetitions are used on the downlink, sub-frame *n* refers to the last subframe in the repetition period in which the message containing the MAC control information was received. The UE shall not apply a TA command during an uplink repetition period.

### 7.22.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to $\pm 13.33 * T_S$ seconds to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command is expressed in multiples of $16 * T_S$ and is relative to the current uplink timing.

# 7.23 Radio Link Monitoring for Category NB1 UE

## 7.23.1 Introduction

The applicability of the requirements for performing radio link monitoring for Category NB1 UE in subclause 7.23 is defined in Section 3.1.

The UE shall monitor the downlink link quality based on the narrowband reference signal in order to detect the downlink radio link quality of the NB-IoT cell as specified in [3].

## 7.23.2 Requirements for Category NB1 UE

The requirements defined in this subclause 7.23.2 for performing radio link monitoring are applicable for Category NB1 UE defined in Section 3.1.

The UE shall meet all applicable requirements specified in clause 7.23.2 under the following condition:

- at least 1 DL subframe per radio frame of serving NB-IoT cell is available at the UE during $Q_{out_NB\text{-}IoT}$ and $Q_{in_NB\text{-}IoT}$ evaluation periods.

The UE shall estimate the downlink radio link quality and compare it to the thresholds $Q_{out_NB\text{-}IoT}$ and $Q_{in_NB\text{-}IoT}$ for the purpose of monitoring downlink radio link quality of the NB-IoT cell.

The threshold $Q_{out_NB\text{-}IoT}$ is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical NPDCCH transmission with transmission parameters specified in Table 7.23.2-1.

The threshold $Q_{in_NB\text{-}IoT}$ is defined as the level at which the downlink radio link quality can be significantly more reliably received than at $Q_{out_NB\text{-}IoT}$ and shall correspond to 2% block error rate of a hypothetical NPDCCH transmission with transmission parameters specified in Table 7.23.2-1.

**Table 7.23.2-1 NPDCCH transmission parameters for out-of-sync and in-sync for Category NB1 UE**

| Attribute | Out-of-sync | In-sync |
|---|---|---|
| DCI format | Format N1 | Format N1 |
| Number of information bits | 23 bits | 23 bits |
| System Bandwidth | 200kHz | 200kHz |
| Antenna configuration | 2x1 | 2x1 |
| Maximum NPDCCH Repetition level | $R_{max}$ Note1 | $R_{max}/4$ Note1 |
| Aggregation level | 2 | 2 |
| DRX | OFF | OFF |
| NOTE 1: $R_{max}$ is a configurable parameter defined in TS 36.331[2]. | | |

### 7.23.2.1 Minimum requirement when no DRX is used

When the downlink radio link quality of the NB-IoT cell estimated over the last $T_{Evaluate_Q_{out_NB\text{-}IoT}}$ period becomes worse than the threshold $Q_{out_NB\text{-}IoT}$, Layer 1 of the UE shall send an out-of-sync indication for the NB-IoT cell to the higher layers within $T_{Evaluate_Q_{out_NB\text{-}IoT}}$ evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the NB-IoT cell estimated over the last $T_{Evaluate_Q_{in_NB\text{-}IoT}}$ period becomes better than the threshold $Q_{in_NB\text{-}IoT}$, Layer 1 of the UE shall send an in-sync indication for the NB-IoT cell to the higher layers within $T_{Evaluate_Q_{in_NB\text{-}IoT}}$ evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the NB-IoT cell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least 10ms.

The transmitter power of the UE shall be turned off within 40ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2]. The following table 7.23.2.1-1 defines the $T_{Evaluate_Q_{out_NB\text{-}IoT}}$ and $T_{Evaluate_Q_{in_NB\text{-}IoT}}$.

**Table 7.23.2.1-1 $Q_{out}$ and $Q_{in}$ Evaluation Period in non-DRX for Category NB1 UE**

| Configured NPDCCH $R_{max}$ | $T_{Evaluate_Q_{out_NB\text{-}IoT}}$ | $T_{Evaluate_Q_{in_NB\text{-}IoT}}$ |
|---|---|---|
| $R_{max} \leq 64$ | 400ms | 200ms |
| $R_{max} > 64$ | 4000ms | 2000ms |

### 7.23.2.2 Minimum requirement when DRX is used

When DRX is used for Category NB1 UE UEs, the $Q_{out_NB\text{-}IoT}$ evaluation period ($T_{Evaluate_Q_{out_DRX_NB\text{-}IoT}}$) and the $Q_{in_NB\text{-}IoT}$ evaluation period ($T_{Evaluate_Q_{in_DRX_NB\text{-}IoT}}$) is specified in Table 7.23.2.2-1 will be used.

When the downlink radio link quality of the NB-IoT cell estimated over the last $T_{Evaluate_Q_{out_DRX_NB\text{-}IoT}}$ [s] period becomes worse than the threshold $Q_{out_NB\text{-}IoT}$, Layer 1 of the UE shall send out-of-sync indication for the NB-IoT cell to the higher layers within $T_{Evaluate_Q_{out_DRX_NB\text{-}IoT}}$ [s] evaluation period. A Layer 3 filter shall be applied to the out-of-sync indications as specified in TS 36.331 [2].

When the downlink radio link quality of the NB-IoT cell estimated over the last $T_{Evaluate_Q_{in_DRX_NB\text{-}IoT}}$ [s] period becomes better than the threshold $Q_{in_NB\text{-}IoT}$, Layer 1 of the UE shall send in-sync indications for the NB-IoT cell to the higher layers within $T_{Evaluate_Q_{in_DRX_NB\text{-}IoT}}$ [s] evaluation period. A L3 filter shall be applied to the in-sync indications as specified in TS 36.331 [2].

The out-of-sync and in-sync evaluations of the NB-IoT cell shall be performed as specified in clause 4.2.1 in [3]. Two successive indications from Layer 1 shall be separated by at least max(10ms, DRX_cycle_length).

Upon start of T310 timer as specified in clause 5.3.11 in TS 36.331 [2], the UE shall monitor the link for recovery using the evaluation period and Layer 1 indication interval corresponding to the non-DRX mode until the expiry or stop of T310 timer.

The transmitter power of the UE shall be turned off within 40 ms after expiry of T310 timer as specified in clause 5.3.11 in TS 36.331 [2].

**Table 7.23.2.2-1: $Q_{out}$ and $Q_{in}$ Evaluation Period in DRX for Category NB1 UE**

| DRX cycle length (s) | $T_{Evaluate_Qout_DRX_NB\text{-}IoT}$ and $T_{Evaluate_Qin_DRX_NB\text{-}IoT}$ (s) | |
|---|---|---|
| | DRX cycles for $R_{max} \leq 64$ | DRX cycles for $R_{max} > 64$ |
| 0.256 < DRX cycle ≤ 1.024 | Note 1 (20) | Note 1 (40) |
| 1.024 < DRX cycle ≤ 3.072 | Note 1 (10) | Note 1 (20) |
| 4.096 < DRX cycle ≤ 10.24 | Note 1 (5) | Note 1 (10) |
| NOTE 1: Evaluation period length in time depends on the length of the DRX cycle in use | | |

### 7.23.2.3 Minimum requirement at transitions

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the NB-IoT cell.

# 7.24 UE transmit timing for Category M1

## 7.24.1 Introduction

The Category M1 UE shall have the capability to follow the frame timing change of the connected eNode B. The uplink frame transmission takes place $(N_{\mathrm{TA}}+N_{\mathrm{TAoffset}})\times T_{\mathrm{s}}$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell.

The UE shall use the serving cell as the reference cell for deriving the UE transmit timing. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements.

## 7.24.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 7.24.2-1. This requirement applies when it is the first transmission in a DRX cycle, eDRX_CONN cycle, or the first transmission in a repetition period (R>1) for PUCCH, PUSCH, and SRS, or the first transmission after an uplink transmission gap in a repetition period (R>1) for PUCCH or PUSCH, or it is the PRACH transmission, or it is the transmission on PUR. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the serving cell minus $(N_{\mathrm{TA_Ref}}+N_{\mathrm{TAoffset}})\times T_{\mathrm{s}}$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the serving cell. $N_{\mathrm{TA_Ref}}$ for PRACH is defined as 0. $(N_{\mathrm{TA_Ref}}+N_{\mathrm{TAoffset}})$ (in $T_s$ units) for other channels is the difference between UE transmission timing and the Downlink timing immediately after when the last timing advance in clause 7.3 was applied. $N_{\mathrm{TA_Ref}}$ for other channels is not changed until the next timing advance is received.

**Table 7.24.2-1: $T_e$ Timing Error Limit**

| CE Mode | $T_{e_}$ |
|---|---|
| A | $24*T_S$ |
| B | $48*T_S$ |
| NOTE 1: $T_S$ is the basic timing unit defined in TS 36.211.<br>NOTE 2: This requirement applies regardless of the downlink carrier bandwidth. | |

When it is not the first transmission in a DRX or eDRX_CONN cycle or there is no DRX or no eDRX_CONN cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall, when no repetitions are configured on the uplink or the repetition period is R=1, be capable of changing the transmission timing according to the received downlink frame of the serving cell except when the timing advance in clause 7.3 is applied such that the UE transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 7.24.2-1.

When no repetition period is configured, or the configured repetition period is R=1, all adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be $T_q$ seconds.

2) The minimum aggregate adjustment rate shall be $7*T_S$ per second.

3) The maximum aggregate adjustment rate shall be $T_q$ per 200ms.

where the maximum autonomous time adjustment step $T_q$ is specified in Table 7.24.2-2.

**Table 7.24.2-2: $T_q$ Maximum Autonomous Time Adjustment Step**

| CE Mode | $T_q$ |
|---|---|
| A | $17.5*T_S$ |
| B | $17.5*T_S$ |
| NOTE 1: $T_S$ is the basic timing unit defined in TS 36.211.<br>NOTE 2: This requirement applies regardless of the downlink carrier bandwidth. | |

When a repetition period is configured on the uplink for which R>1, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission as defined above.

# 7.25 Cell phase synchronization accuracy for MBMS services (FDD)

## 7.25.1 Definition

Cell phase synchronization accuracy is defined as the maximum absolute deviation in frame start timing between any pair of cells that have overlapping coverage areas in the same MBSFN area.

## 7.25.2 Minimum requirements

For eNodeB capable of supporting MBMS services, the cell phase synchronization accuracy measured at BS antenna connectors shall be better than the requirement specified in table 7.25.2-1.

**Table 7.25.2-1: Cell phase synchronization requirement for MBMS services (FDD)**

| CP length for MBSFN subframe | Requirement |
|---|---|
| 16.67 µs | ≤ 5 µs |
| 33.33 µs | ≤ 5 µs |
| 200 µs | ≤ 5 µs |
| 100 µs | ≤ 5 µs |
| 300 µs | ≤ [5] µs |

Note 1: When MBSFN subframe using $\Delta f = 15\text{kHz}$ is configured for a MBSFN area, the CP length for MBSFN subframes is 16.67µs. When MBSFN subframe using $\Delta f = 7.5\text{kHz}$ is configured for a MBSFN area, the CP length for MBSFN subframes is 33.33µs.When MBSFN subframe using $\Delta f = 1.25\text{ kHz}$ is configured for a MBSFN area, the CP length for MBSFN subframes is 200µs. When MBSFN subframe using $\Delta f = 2.5$ kHz is configured for a MBSFN area, the CP length for MBSFN subframes is 100 µs. When MBSFN subframe using $\Delta f = 370.73$ Hz is configured for a MBSFN area, the CP length for MBSFN subframes is 300 µs.

# 7.26 UE transmit timing for Category M2

## 7.26.1 Introduction

The Category M1 UE shall have the capability to follow the frame timing change of the connected eNode B. The uplink frame transmission takes place $(N_{TA}+N_{TAoffset})\times T_s$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell.

The UE shall use the serving cell as the reference cell for deriving the UE transmit timing. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements.

## 7.26.2 Requirements

The requirements defined in clause 7.24 also apply for this section with following change for the UE initial transmission timing error which shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 7.26.2-1.

**Table 7.26.2-1: $T_e$ Timing Error Limit**

| CE Mode | Downlink Bandwidth (MHz) | $T_{e_}$ |
|---|---|---|
| A | 1.4 | $24*T_S$ |
| A | 5 | $12*T_S$ |
| B | 1.4 | 48*Ts |
| B | 5 | $40*T_S$ |
| NOTE 1: $T_S$ is the basic timing unit defined in TS 36.211.<br>NOTE 2: This requirement applies regardless of the downlink carrier bandwidth. | | |

# 7.27 UE timer accuracy for category M1

## 7.27.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

## 7.27.2 Requirements

The requirements defined in clause 7.21.2 also apply for this section.

# 7.28 Timing Advance for Category M1

## 7.28.1 Introduction

The timing advance is initiated from E-UTRAN with MAC message that implies and adjustment of the timing advance, see TS 36.321 [17] clause 5.2.

## 7.28.2 Requirements

The requirements defined in clause 7.3.2 also apply for this section.

# 7.29 Interruptions requirements with FeMBMS

## 7.29.1 Introduction

The requirements in this section shall apply for the UE which is capable of receiving PMCH in MBSFN subframes using at least one of the following numerologies:

- subcarrier spacing of 7.5 kHz and the cyclic prefix length of 1024 Ts and
- subcarrier spacing of 1.25 kHz and the cyclic prefix length of 6144 Ts.
- subcarrier spacing of 2.5 kHz and the cyclic prefix length of 3072 Ts and

- subcarrier spacing of 370.37 Hz and the cyclic prefix length of 9216 Ts.

### 7.29.2 Requirements

When UE receives signals or channels in MBSFN subframes based on a numerology which is different than the numerology used in a preceding or succeeding downlink non-MBSFN subframe, the UE shall switch between the two numerologies without causing any interruption to the UE operations in the non-MBSFN subframes.

## 7.30 Numerology switching delay requirements with FeMBMS

### 7.30.1 Introduction

The requirements in this section shall apply for the UE which is capable of receiving PMCH in MBSFN subframes using at least one of the following numerologies:

- subcarrier spacing of 7.5 kHz and the cyclic prefix length of 1024 Ts and
- subcarrier spacing of 1.25 kHz and the cyclic prefix length of 6144 Ts.
- subcarrier spacing of 2.5 kHz and the cyclic prefix length of 3072 Ts and
- subcarrier spacing of 370.37 Hz and the cyclic prefix length of 9216 Ts.

### 7.30.2 Requirements

When UE receives MBSFN subframes with PMCH based on a numerology which is different than the numerology used in a preceding or succeeding downlink non-MBSFN subframe, the UE shall switch between the two numerologies without causing any delay to the UE operations in the non-MBSFN subframes.

## 7.31 NR PSCell Addition and Release Delay for E-UTRA - NR Dual Connectivity

### 7.31.1 Introduction

This section defines requirements for the delay within which the UE shall be able to configure an NR PSCell in EN-DC. The requirements are applicable to an E-UTRA-FDD – NR and E-UTRA-TDD – NR dual connectivity capable UE.

### 7.31.2 NR PSCell Addition Delay Requirement

The requirements in this section shall apply for the UE which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving NR PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards NR PSCell no later than in subframe $n + T_{\text{config PSCell}}$:

Where:

$T_{\text{config_PSCell}} = T_{\text{RRC_delay}} + T_{\text{processing}} + T_{\text{search}} + T_{\Delta} + T_{\text{PSCell_ DU}} + 2$ ms

$T_{\text{RRC_delay}}$ is the RRC procedure delay as specified in [2].

$T_{\text{processing}}$ is the SW processing time needed by UE, including RF warm up period. $T_{\text{processing}} = 20$ ms if NR PSCell is in FR1, $T_{\text{processing}} = 40$ ms if NR PSCell is in FR2.

$T_{\text{search}}$ is the time for AGC settling and PSS/SSS detection.

- For NR PSCell in FR1: if the target cell is a known cell, $T_{\text{search}} = 0$ ms. If the target cell is an unknown cell and the target cell Es/Iot $\geq$ -2 dB, then $T_{\text{search}} = 3^*$ Trs ms;
- For NR PSCell in FR2: if the target cell is a known cell, $T_{\text{search}} = 0$ ms. If the target cell is an unknown cell and the target cell Es/Iot $\geq$ -2 dB, then $T_{\text{search}} = 24^*$ Trs ms.

$T_{\Delta}$ is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta}$ = 1*Trs ms for a known or unknown PSCell.

$T_{PSCell_DU}$ is the delay uncertainty in acquiring the first available PRACH occasion in the NR PSCell. $T_{PSCell_DU}$ is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [39].

Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this section is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

In FR1 and FR2, the NR PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the NR PSCell configuration command:

- the UE has sent a valid measurement report for the NR PSCell being configured and
- One of the SSBs measured from the NR PSCell being configured remains detectable according to the cell identification conditions specified in section 9.3 of TS 38.133 [50],
- One of the SSBs measured from NR PSCell being configured also remains detectable during the NR PSCell configuration delay according to the cell identification conditions specified in section 9.3 of TS 38.133 [50].

otherwise it is unknown.

The PCell interruption specified in section 7.32 is allowed only during the RRC reconfiguration procedure [2].

### 7.31.3 NR PSCell Release Delay Requirement

The requirements in this section shall apply for a UE which is configured with PCell and NR PSCell, and may also be configured with one or more SCells and/or NR SCells.

Upon receiving NR PSCell release in subframe *n*, the UE shall accomplish the release actions specified in [2] no later than in subframe $n + T_{RRC_delay}$:

Where

$T_{RRC_delay}$ is the RRC procedure delay as specified in [2].

The PCell interruption specified in section 7.32 is allowed only during the RRC reconfiguration procedure [2].

## 7.31A Addition and Release Delay of NR PSCell Operating with CCA for E-UTRA - NR Dual Connectivity

### 7.31A.1 Introduction

This section defines requirements for the delay within which the UE shall be able to configure an NR PSCell operating with CCA in EN-DC. The requirements are applicable to an E-UTRA-FDD – NR and E-UTRA-TDD – NR dual connectivity capable UE.

In the requirements of clause 7.31A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period; otherwise the SMTC occasion is considered as available at the UE.

### 7.31A.2 NR PSCell Addition Delay Requirement

The requirements in this section shall apply for the UE which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving NR PSCell addition in subframe *n*, the UE shall be capable to transmit PRACH preamble towards NR PSCell no later than in subframe $n + T_{\text{config PSCell_withCCA}}$:

Where:

$T_{\text{config_PSCell_withCCA}} = T_{\text{RRC_delay}} + T_{\text{processing}} + T_{\text{search_withCCA}} + T_{\Delta\text{_withCCA}} + T_{\text{PSCell_ DU_withCCA}} + 2$ ms

$T_{\text{RRC_delay}}$ is the RRC procedure delay as specified in [2].

$T_{\text{processing}}$ is the software processing time needed by UE, including RF warm up period. $T_{\text{processing}} = 20$ ms.

$T_{\text{search_withCCA}}$ is the time for AGC settling and PSS/SSS detection.

- If the target cell is known, then $T_{\text{search_withCCA}} = 0$ ms. If the target cell is an unknown cell and the target cell Es/Iot $\geq$ -2 dB, then $T_{\text{search_withCCA}} = (3 + L_1)*$ Trs ms where $L_1$ is the number of SMTC occasions not available at the UE for AGC settling and PSS/SSS detection.

$T_{\Delta\text{_withCCA}}$ is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta\text{_withCCA}} = (1+ L_2)*$Trs ms for a known or for an unknown PSCell where $L_2$ is the number of SMTC occasions not available at the UE for fine time tracking and acquiring full timing information.

$T_{\text{PSCell_ DU_withCCA}}$ is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell:

$T_{\text{PSCell_ DU_withCCA}} = (1+L_3)\times T_{\text{SSB,RO}} + 10$ ms; where:

- $L_3$ is the consecutive number of SSB to PRACH occasion association periods during which no PRACH occasion is available for PRACH transmission due to UL CCA failures. $L_3 = 0$ for Type 2C UL channel access procedure as defined in TS 37.213 [33].

- $T_{\text{SSB,RO}}$ is the SSB to PRACH occasion association period as defined in the table 8.1-1 of TS 38.213 [3].

- The value of L3 is limited by *PREAMBLE_TRANSMISSION_COUNTER*, which is increased when PRACH occasion is unavailable for PRACH transmission due to UL CCA failure as specified in TS 38.321 [7]. The UE behaviour when *PREAMBLE_TRANSMISSION_COUNTER* reaches the *preambleTransMax* is specified in TS 38.321 [7].

Trs is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the *measObjectNR* having the same SSB frequency and subcarrier spacing. If UE is not provided SMTC configuration or measurement object on this frequency: the requirement in this clause is applied with Trs =5 ms assuming the SSB transmission periodicity is 5ms, and there is no requirement if the SSB transmission periodicity is not 5 ms.

NOTE 1: The PSCell addition delay including the potential extensions caused by $L_1$, $L_2$ and $L_3$ is limited by the T304 timer [2].

The NR PSCell operating with CCA is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the NR PSCell configuration command:

- the UE has sent a valid measurement report for the NR PSCell being configured and

- One of the SSBs measured from the NR PSCell being configured remains detectable according to the cell identification conditions in the SMTC occasions available at the UE, as specified in section 9.3A of TS 38.133 [50],

- One of the SSBs measured from NR PSCell being configured also remains detectable during the NR PSCell configuration delay according to the cell identification conditions in the SMTC occasions available at the UE, as specified in section 9.3A of TS 38.133 [50].

otherwise it is unknown. The PCell interruption specified in section 7.32 is allowed only during the RRC reconfiguration procedure [2].

## 7.31A.3 NR PSCell Release Delay Requirement

The requirements in this section shall apply for a UE which is:

- configured with PCell, and
- configured with NR PSCell operating with CCA, and
- may also be configured with one or more SCells, and
- may also be configured with one or more NR SCells operating with CCA.

Upon receiving NR PSCell release in subframe *n*, the UE shall accomplish the release actions specified in [2] no later than in subframe $n + T_{RRC_delay}$:

Where

$T_{RRC_delay}$ is the RRC procedure delay as specified in [2].

The PCell interruption specified in section 7.32 is allowed only during the RRC reconfiguration procedure [2].

# 7.32 Interruptions with EN-DC

## 7.32.1 Introduction

This section contains the requirements related to the interruptions on PCell, and MCG SCell when

NR PSCell is added or released, or

transitions between active and non-active during NR PSCell DRX, or

transitions from NR PSCell non-DRX to DRX, or

SCell in either E-UTRA MCG or NR SCG is added or released, or

SCell(s) in either E-UTRA MCG or NR SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA MCG or NR SCG, or

a downlink bandwidth part (BWP) and/or an uplink BWP is switched in NR PSCell or in any NR SCell, or

UE dynamic Tx switches between two uplink carriers, or

NR SRS carrier based switching is performed.

The requirements shall apply for EN-DC.

This section contains interruption requirements when the victim cell is PCell or SCell belonging to MCG. Requirements for interruptions where victim cell is the NR PSCell or an NR SCell belonging to SCG are specified in [50].

For a UE which does not support per-FR measurement gaps, interruptions to the PCell or active MCG SCells may be caused by NR PSCell or NR SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PCell or active MCG SCells may be caused by NR PSCell or NR SCells on FR1 only.

## 7.32.2 Requirements

### 7.32.2.1 Interruptions at PSCell addition/release

The UE is allowed an interruption of up to X1 subframes (synchronous EN-DC) or X1+1 subframes (asynchronous EN-DC) on PCell and activated SCells in MCG if configured during the RRC reconfiguration procedure in intraband EN-DC. This interruption is for both uplink and downlink of PCell. For PSCell addition X1 is equal to the duration of the SMTC of the PSCell being added + 1 ms. For PSCell release X1 is equal to 1ms. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot.

The UE is allowed an interruption of up to 1 subframe (synchronous EN-DC) or 2 subframes (asynchronous EN-DC) on PCell and activated SCells in MCG if configured during the RRC reconfiguration procedure in interband EN-DC. This interruption is for both uplink and downlink of PCell.

### 7.32.2.2 Interruptions at transitions between active and non-active during DRX

When PCell is in non-DRX and NR PSCell is in DRX, interruptions on PCell and the activated MCG SCells if configured due to transitions from active to non-active and from non-active to active during NR PSCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured NR PSCell DRX cycle is less than 640ms, and 0.625% probability of missed ACK/NACK is allowed when the configured NR PSCell DRX cycle is 640ms or longer. Each interruption shall not exceed 2 subframes for asynchronised EN-DC or 1 subframe for synchronised EN-DC.

When both PCell and NR PSCell are in DRX, no interruption is allowed.

### 7.32.2.3 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell in MCG if configured due to NR PSCell transitions from non-DRX to DRX when PCell is in non-DRX shall not exceed 5 subframes for asynchronised EN-DC or 1 subframe for synchronised EN-DC.

### 7.32.2.4 Interruptions at SCell addition/release

When one SCell belonging to MCG is added or released:

- the requirements in clause 7.8.2.7 shall apply.

When one NR SCell belonging to SCG is added or released:

- an interruption on PCell or activated SCell in MCG shall not exceed X1 subframes for synchronous intraband EN-DC, X1+1 subframes for asynchronous intraband EN-DC, 1 subframe for synchronous interband EN-DC or 2 subframes for asynchronous interband EN-DC. For SCell addition X1 is equal to the duration of the SMTC of the SCell being added + 1 ms. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and $T_{SMTC\ duration}$ for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, $T_{SMTC\ duration}$ for the SCell being added is 0ms.

- The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell release X1 is equal to 1ms.

### 7.32.2.5 Interruptions at SCell activation/deactivation

When one SCell belonging to MCG is activated or deactivated:

- the requirements in clause 7.8.2.8 shall apply.

When one NR SCell belonging to SCG is activated or deactivated

- an interruption on PCell or activated SCell in MCG shall not exceed X1 subframes for synchronous intraband EN-DC, X1+1 subframes for asynchronous intraband EN-DC, 1 subframe for synchronous interband EN-DC or 2 subframes for asynchronous interband EN-DC. For SCell activation X1 is equal to the duration of the SMTC of the SCell being activated + 1 ms. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and $T_{SMTC\ duration}$ for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, $T_{SMTC\ duration}$ for the SCell being activated is 0ms.

- The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell deactivation X1 is equal to 1ms.

When multiple NR SCells in SCG is activated or deactivated by a single MAC CE

- an interruption on PCell or activated SCell in MCG shall not exceed X1 subframes if the PCell or activated SCell is in the same band as any of the NR SCell being activated with synchronous EN-DC, X1+1 subframes if the PCell or activated SCell is in the same band as any of the NR SCell being activated with asynchronous EN-DC, 1 subframe if the PCell or activated SCell is not the same band as any of the NR SCell being activated with

synchronous EN-DC, or 2 subframes if the PCell or activated SCell is not the same band as any of the NR SCell being activated with asynchronous EN-DC. For SCell activation X1 is equal to the longest duration of the SMTC of the NR SCells being activated in the same band as the interrupted cell + 1 ms. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell deactivation X1 is equal to 1ms.

### 7.32.2.6 Interruptions during measurements on SCC

#### 7.32.2.6.1 Interruptions during measurements on deactivated NR SCC

PCell or activated SCell(s) interruptions due to measurements when an NR SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer.

- For inter-band EN-DC, the UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed 1 subframe for synchronous inter-band EN-DC or 2 subframes for asynchronous inter-band EN-DC.
- For synchronous intra-band EN-DC, the UE is only allowed to cause an interruption no earlier than 1 subframe before an SMTC and no later than 1 subframe after the SMTC. The interruption shall not exceed the duration of the SMTC of the deactivated NR SCell + 2 subframes. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot.

#### 7.32.2.6.2 Interruptions during measurements on deactivated E-UTRA SCC

PCell interruptions due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. Each interruption shall not exceed:

- 1 subframes if the PCell is not in the same band as the deactivated SCell
- 5 subframes if the PCell is in the same band as the deactivated SCell

SCell interruptions due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. Each interruption shall not exceed:

- 1 subframes if the SCell is not in the same band as the deactivated SCell
- 5 subframes if the SCell is in the same band as the deactivated Scell

#### 7.32.2.6.3 Interruptions during CQI measurements on dormant E-UTRA SCell

PCell and SCell interruptions due to CQI measurements when an SCell is dormant are allowed as defined in clause 7.8.2.17.

#### 7.32.2.6.4 Interruptions during RRM measurements on dormant E-UTRA SCC

PCell and SCell interruptions due to RRM measurements when an SCell is dormant are allowed as defined in

- clause 7.8.2.18 if PCell and/or activated SCell are in the same band as the dormant SCell
- clause 7.8.2.19 if PCell and/or activated SCell are not in the same band as the dormant SCell

### 7.32.2.7 Interruptions at active BWP switching

The requirements in this clause shall apply for the UE configured with only NR PSCell or with NR PSCell and one or more NR SCells. The requirements in the section apply to the case that the BWP switch is performed on a single CC or multiple CCs.

When either of the DCI-based, timer-based or RRC-based downlink BWP switch and/or uplink BWP switch occur on multiple CCs simultaneously or over partially overlapping period, the interruption requirements described in this section apply for each BWP switch.

DCI-based or timer-based downlink BWP and/or uplink BWP switching due to change in any of the parameters listed in Table 8.2.1.2.7-2 of TS 38.133 [50] or SCS in NR PSCell or in any NR SCell may cause an interruption on PCell or on activated SCell(s) in the MCG. Interruptions are not allowed during BWP switch involving other parameter change.

Uplink BWP switching on a NR PSCell triggered by consistent uplink LBT failures on the NR PSCell may cause an interruption on PCell or on activated SCell(s) in the MCG.

The starting time of interruption due to DCI-based or timer-based downlink BWP and/or uplink BWP switching or due to uplink BWP switching on a NR PSCell triggered by consistent uplink LBT failures on the NR PSCell is only allowed within the BWP switching delay $T_{BWPswitchDelay}$ as defined in clause 8.6.2 of TS 38.133 [50] when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay $T_{MultipleBWPswitchDelay}$ +Y as defined in clause 8.6.2A.1 of TS 38.133 [50] when DCI-based BWP switch occurs on multiple CCs. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay $T_{MultipleBWPswitchDelay}$ as defined in clause 8.6.2B.1 of TS 38.133 [50] when timer-based BWP switch occurs on multiple CCs simultaneously or $T_{MultipleBWPswitchDelayTotal}$ as defined in clause 8.6.2B.2 of TS 38.133 [50] when timer-based BWP switch occurs on multiple CCs over partially overlapping time period.

RRC-based downlink BWP and/or uplink BWP switching due to change in any of the parameters listed in Table 8.2.1.2.7-2 of TS 38.133 [50] or SCS in NR PSCell or in any NR SCell may cause an interruption on PCell or on activated SCell(s) in the MCG. Interruptions are not allowed during BWP switch involving other parameter change.

The interruption due to RRC-based downlink BWP and/or uplink BWP switching is allowed anywhere within the BWP switching delay ($T_{RRCprocessingDelay}$ + $T_{BWPswitchDelayRRC}$) defined in clause 8.6.3 of TS 38.133 [50] when BWP switch occurs on a single CC. The interruption is only allowed within the delay $T_{RRCprocessingDelay}$ + $T_{BWPswitchDelayRRC}$ + $D_{RRC}$*(N-1) as defined in clause 8.6.3A of TS 38.133 [50] when BWP switch occurs on multiple CCs.The interruption due to RRC-based downlink BWP and/or uplink BWP switching defined in this clause is applicable provided that:

- the RRC reconfiguration requires the UE to only switch its active BWP and

When BWP switch involves SCS changes,

> the UE is allowed to cause interruption on PCell or on any activated SCell(s) regardless of the frequency range of the NR PCell or NR SCell on which the BWP switching occurs.

Otherwise,

> the UE capable of per UE measurement gap [2] is allowed to cause interruption on PCell or on any activated SCell(s) regardless of the frequency range of the NR PSCell or NR SCell on which the BWP switching occurs;
>
> the UE capable of per FR measurement gap [2] is allowed to cause interruption on PCell or on any activated SCell(s) provided that the NR PSCell or NR SCell on which the BWP switching occurs belongs to FR1.

The interruption on PCell or on any activated SCell(s) shall not exceed:

- 1 subframe in synchronous EN-DC,
- 2 subframes in asynchronous EN-DC.

### 7.32.2.8 Interruptions at SCell activation and deactivation of dormant SCell

When one dormant SCell belonging to MCG is activated and deactivated, UE is allowed interruptions on PCell and any activated SCell(s) as defined in

- clause 7.8.2.14 if PCell and/or activated SCell are in the same band as the dormant SCell
- clause 7.8.2.15 if PCell and/or activated SCell are not in the same band as the dormant SCell

### 7.32.2.9 Interruptions at SCell activation and deactivation of multiple dormant SCell

When any number of SCells in a dormant state between one and six is activated and deactivated using the same MAC control element as defined in TS 36.321 [17], UE is allowed interruptions on PCell and any activated SCell(s) as defined in clause 7.8.2.16.

### 7.32.2.10 Interruptions at SCell hibernation

When any number of SCells in activated or deactivated state between one and six is hibernated using the same MAC control element as defined in TS 36.321 [17], UE is allowed interruptions on PCell and any activated SCell(s) as defined in clause 7.8.2.20.

### 7.32.2.11 Interruptions at direct SCell activation and hibernation

When any number of SCells between one and M is directly activated or hibernated using the same RRC message as defined in TS 36.331 [2], UE is allowed interruptions on PCell and any activated SCell(s) as defined in clause 7.8.2.21.

When one or multiple NR SCell(s) belonging to SCG are directly activated

- an interruption on PCell or activated SCell in MCG shall not exceed X1 subframes for synchronous intraband EN-DC, X1+1 subframes for asynchronous intraband EN-DC, 1 subframe for synchronous interband EN-DC or 2 subframes for asynchronous interband EN-DC. For direct SCell activation X1 is equal to the duration of the SMTC of the SCell being activated + 1 ms. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot.

### 7.32.2.12 DL Interruptions at UE switching between two uplink carriers

The DL interruption requirements at dynamic switching between two uplink carriers specified in this sub-clause are applicable for an uplink band pair of an inter-band EN-DC configuration when the capability *uplinkTxSwitchingPeriod* is present, and is only applicable for uplink switching mechasim specified in sub-clause 6.1.0 of TS 38.38.214 [26], where E-UTRA UL carrier is capable of one transmit antenna connector and NR UL carrier is capable of two transmit antenna connectors, and the two uplink carriers are in different bands with different carrier frequencies.

When dynamic switching between two uplink carriers is conducted, UE is allowed to cause DL interruption of X OFDM symbols in E-UTRA downlink carrier(s) as indicated by *uplinkTxSwitching-DL-Interruption* [2]. The DL interruption starts from the first OFDM symbol which fully or partially overlaps with the UL switching period in NR carrier. The DL interruption lengths of X for EUTRA carrier(s) are defined in Table 7.32.2.12-1.

No DL interruption is allowed in the E-UTRA downlink carrier(s) which is not indicated by *uplinkTxSwitching-DL-Interruption*. No DL interruption is allowed for some inter-band EN-DC configurations as specified in clause 5.5B.4 of TS 38.101-3 [54].

**Table 7.32.2.12-1: DL interruption length on EUTRA carrier(s) in the unit of OFDM symbols (X) at UE switching between two uplink carriers**

| Uplink Tx switching period Note1 | |
|---|---|
| **35us** | **140us** |
| 2 | 3 |
| Note 1: Uplink Tx switching period depends on UE capability uplinkTxSwitchingPeriod. | |

### 7.32.2.13 Interruptions at NR SRS carrier based switching

NR SRS, defined in TS 38.215 [58], can be configured on a carrier not configured for PUCCH/PUSCH transmission. When a UE needs to transmit periodic, semi-persistent or aperiodic NR SRS on a NR carrier of a serving cell not configured for PUCCH/PUSCH transmission, the UE can perform carrier based switching to one or more carriers not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission or from a carrier not configured for PUCCH/PUSCH transmission prior to transmitting the NR SRS, provided that:

- switching is from a configured NR carrier to an active BWP of another activated NR carrier;
- the carrier of SCells not configured for PUCCH/PUSCH transmission to which NR SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic NR SRS transmission, or indicated by MAC-CE for semi-persistent NR SRS transmission, or configured via RRC for periodic NR SRS transmission;
- the serving cell, from which NR SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier* in TS38.331 [38];
- the NR SRS switching is not colliding with any other transmission with higher priority defined in TS 38.214 [51] ;
- the NR SRS switching is not colliding with any measurements in SCG;
- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 38.331 [38], and is compliant to the requirements for inter-band CA with uplink in one NR band and without

simultaneous Rx/Tx specified in TS 38.101 [52], the NR SRS transmissions are not simultaneously scheduled with DL SSB/ CSI-RS for L3 or L1 measurements on other carriers.

The UE shall not perform NR SRS carrier based switching if the above conditions cannot be met.

The interruption on PCC and each of the activated SCCs during the NR SRS carrier switching to the NR SCC not configured for PUCCH/PUSCH transmission shall not exceed X1 subframes as defined in Table 7.32.2.13-1 including the first subframe where NR SRS transmission is configured on the NR SCC not configured for PUCCH/PUSCH transmission.

The interruption on PCC and each of the activated SCCs during the NR SRS carrier switching from the NR SCC not configured for PUCCH/PUSCH transmission shall not exceed X1 subframes as defined in Table 7.32.2.13-1 including the last subframe where NR SRS transmission is configured on the NR SCC not configured for PUCCH/PUSCH transmission.

**Table 7.32.2.13-1: Interruption length X1 at NR SRS carrier based switching**

| NR SRS carrier switching time (us)[note1] | Interruption length X1 (subframes) |
|---|---|
| ≤500 | 2 |
| 900 | 3 |
| Note1: NR SRS carrier switching time is UE capability indicated by higher layer parameter *SRS-SwitchingTimeNR*. | |

## 7.32.2.14 Interruptions at NR SCell dormancy

### 7.32.2.14.1 Interruptions due to NR SCell dormancy switch

When one NR SCell in SGC is switched from dormancy to non-dormancy or from non-dormancy to dormancy [43] when UE is in DRX active time in SCG,

- the UE is allowed an interruption on any active serving cell in MCG as defined in clause 7.32.2.7, except that the interruption is allowed regardless of which parameters change between the dormant BWP and the non-dormant BWP.

- If the UE is not capable of per-FR gap, or if the dormancy switching involves SCS changing, the interruption is allowed to active serving cell in MCG regardless of the frequency range of the NR SCell on which the dormancy switching occurs. If the UE is capable of per-FR gap and the the dormancy switching does not involve SCS changing, UE is allowed to cause interruption to active serving cells in MCG provided that the NR SCell on which the dormancy switching occurs belongs to FR1.

- The starting time of interruption is only allowed within the dormancy switching delay as defined in clause 8.6.2 of TS 38.133 [50].

When more than one NR SCells in SGC are switched from dormancy to non-dormancy or from non-dormancy to dormancy [43] simultaneously when UE is in DRX active time in SCG, the interruption requirements described above apply for dormancy switch on each SCell in SCG.

### 7.32.2.14.2 Interruptions due to CSI and RRM measurements during SCell dormancy

When one or more NR SCells in SCG are in dormancy, the UE is allowed to cause interruptions on active E-UTRA serving cells due to CSI and RRM measurements on the NR SCell(s) in dormancy.

The rate of ACK/NACK feedback loss on any active E-UTRA serving cell resulting from CSI and RRM measurements on NR SCells in dormancy shall not exceed 0.5% and 1.0%, respectively.

## 7.32.2.15 Interruption during NR measurement with autonomous gaps

When a UE is identifying CGI of an NR cell with autonomous gaps as configured by PCell or NR PSCell, the UE is allowed on PCell or any activated SCell in MCG if configured

- up to K1 interruptions, each with up to X1 interrupted subframes, during MIB decoding time period $T_{MIB}$ specified in clause 9. 11 of TS 38.133 [50] if the CGI reading is configured by NR PSCell, or $T_{MIB_NR}$ specified in clause 8.17. 18 and 8.17. 19 if the CGI reading is configured by LTE PCell,

- up to L1 interruptions, each with up to Y1 interrupted subframes, during SIB1 decoding time period $T_{SIB1}$ specified in clause 9. 11 of TS 38.133 [50] if the CGI reading is configured by NR PSCell, or $T_{SIB1_NR}$ specified in clause 8.17. 18 and 8.17. 19 if the CGI reading is configured by LTE PCell, for SSB and CORESET for RMSI scheduling multiplexing patterns 1,

- up to L2 interruptions, each with up to Y2 interrupted subframes, during SIB1 decoding time period $T_{SIB1}$ specified in clause 9. 11 of TS 38.133 [50] if the CGI reading is configured by NR PSCell, or $T_{SIB1_NR}$ specified in clause 8.17. 18 and 8.17. 19 if the CGI reading is configured by LTE PCell, for SSB and CORESET for RMSI scheduling multiplexing patterns 2 and 3,

where K1, L1, L2, X1, Y1 and Y2 are as defined in 8.2.1.2. 16 of TS 38.133 [50] assuming $\mu$=0 for victim cell.

### 7.32.2.16 Interruptions at SRS carrier based switching

A PUSCH-less SCC is a TDD SCC without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [16] and/or non-contention based PRACH on a PUSCH-less SCC, the UE can perform carrier based switching to one or more PUSCH-less SCCs from a CC with PUSCH or from another PUSCH-less SCC prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured CC to another activated TDD CC;

- the PUSCH-less SCCs to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [2] for periodic SRS transmission or indicated by PDCCH for PRACH;

- the serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [2];

- the SRS switching is not colliding with any other transmission with higher priority defined in [3];

- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in [3];

- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other CCs.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

The interruption on PCC and each of the activated SCCs during the switching to the PUSCH-less SCC shall not exceed 2 subframes including the first subframe where SRS transmission is configured on the PUSCH-less SCC.

The interruption on PCC and each of the activated SCCs during the switching from the PUSCH-less SCC shall not exceed 2 subframes including the last subframe where SRS transmission is configured on the PUSCH-less SCC.

## 7.33 Maximum Transmit/Receive Timing Difference in Carrier Aggregation for sTTI and 1ms-TTI with 3 subframe HARQ processing

### 7.33.1 Introduction

This section defines the requirements for the transmit and receive timing difference in carrier aggregation when *ShortTTI-r15* is configured or *ShortProcessingTime=TRUE*. Requirements in this section apply to a UE capable of any sTTI combination indicated in *sTTI-SupportedCombinations-r15* and/or frameStructureType-SPT when the UE is configured with one or more serving cell(s) where *ShortTTI-r15* is configured and/or *ShortProcessingTime=TRUE*.

### 7.33.2 Requirements

A UE configured with the inter-band carrier aggregation shall meet the maximum received timing difference requirement and the maximum transmit timing difference requirement in the subclause 7.9.2, provided that the conditions defined in the subclause B.7.1 are fulfilled.

For a UE not configured with sTAG, the UE is not expected to handle the combination of the received timing difference(s) between any pair of the serving cells and the timing advance in pTAG if the conditions defined in the subclause B.7.1 cannot be fulfilled under such combination.

For a UE configured with sTAG, the UE is not expected to handle the combination of the received timing difference(s) between any pair of the serving cells, the transmit timing difference between pTAG and sTAG, and the timing advances in pTAG and sTAG if the conditions defined in the subclause B.7.1 cannot be fulfilled under such combination.

# 7.34 Void

# 7.35 Interruptions with SFTD measurements

## 7.35.1 Introduction

This section contains the requirements for UE supporting E-UTRAN FDD – NR dual connectivity related to the interruptions on PCell and activated SCells in MCG if configured, when performing inter-RAT SFTD measurements on NR cells without measurement gaps when no NR PSCell is configured.The inter-RAT SFTD measurement can only be configured for E-UTRA - NR band combinations that are supported by the UE.

## 7.35.2 Requirements

The UE is allowed an interruption of up to 10 subframes on PCell and activated SCells if configured during $T_{measure_SFTD1}$ as specified in 8.1.2.4.25 due to intraband SFTD measurements on NR cells. This interruption is for both uplink and downlink of PCell and activated SCells if configured.

The UE is allowed an interruption on PCell and activated SCells if configured during $T_{measure_SFTD1}$ as specified in 8.1.2.4.25 due to interband SFTD measurements on NR cells with maximum percentage of interrupted subframes on uplink and downlink as specified in Table 7.35.2-1.

Each interruption shall not exceed 1 subframe.

**Table 7.35.2-1: Requirements on maximum percentage of interrupted subframes**

| SFTD configuration | SMTC periodicity | | | | | |
|---|---|---|---|---|---|---|
| | 5 ms | 10 ms | 20 ms | 40 ms | 80 ms | 160 ms |
| With RSRP report | 8.4% | 6.3% | 8.4% | 6.3% | 5.3% | 4.7% |
| Without RSRP report | 11.4% | 8.6% | 7.8% | 6.8% | 6.3% | 6.0% |

# 7.36 Interruptions with NE-DC

## 7.36.1 Introduction

This clause contains the requirements related to the interruptions on PSCell and SCG SCells when

transitions between active and non-active during NR PCell DRX, or

transitions from NR PCell non-DRX to DRX, or

SCell in either NR MCG or E-UTRA SCG is added or released, or

SCell(s) in either NR MCG or E-UTRA SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either NR MCG or E-UTRA SCG, or

a downlink bandwidth part (BWP) and/or an uplink BWP is switched in NR PCell or in any NR SCell,

NR SRS carrier based switching is performed.

The requirements shall apply for NE-DC.

This clause contains interruption requirements when the victim cell is PSCell or SCell belonging to SCG. Requirements for interruptions where victim cell is the NR PCell or an NR SCell belonging to MCG are specified in TS 38.133 [50].

For a UE which does not support per-FR measurement gaps, interruptions to the PSCell or active SCG SCells may be caused by NR PCell or NR SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PSCell or active SCG SCells may be caused by NR PCell or NR SCells on FR1 only.

## 7.36.2 Requirements

### 7.36.2.1 Interruptions at transitions between active and non-active during DRX

When PSCell is in non-DRX and NR PCell is in DRX, interruptions on PSCell and the activated SCG SCells if configured due to transitions from active to non-active and from non-active to active during NR PCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured NR PCell DRX cycle is less than 640 ms, and 0.625 % probability of missed ACK/NACK is allowed when the configured NR PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed 2 subframes for asynchronised NE-DC or 1 subframe for synchronised NE-DC.

When both PSCell and NR PCell are in DRX, no interruption is allowed.

### 7.36.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PSCell and the activated SCell in SCG if configured due to NR PCell transitions from non-DRX to DRX when PSCell is in non-DRX shall not exceed 5 subframes for asynchronised NE-DC or 1 subframe for synchronised NE-DC.

### 7.36.2.3 Interruptions at SCell addition/release

When one SCell belonging to SCG is added or released:

- the requirements in clause 7.8.2.7 shall apply.

When one NR SCell belonging to MCG is added or released:

- an interruption on PSCell or activated SCell in SCG shall not exceed X1 subframes for synchronous intraband NE-DC, X1+1 subframes for asynchronous intraband NE-DC, 1 subframe for synchronous interband NE-DC or 2 subframes for asynchronous interband NE-DC. For SCell addition X1 is equal to the duration of the SMTC of the SCell being added + 1 ms. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and $T_{SMTC\ duration}$ for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, $T_{SMTC\ duration}$ for the SCell being added is 0ms.

- The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell release X1 is equal to 1 ms.

### 7.36.2.4 Interruptions at SCell activation/deactivation

When one SCell belonging to SCG is activated or deactivated:

- the requirements in clause 7.8.2.8 shall apply.

When one NR SCell belonging to MCG is activated or deactivated

- an interruption on PSCell or activated SCell in SCG shall not exceed X1 subframes for synchronous intraband NE-DC, X1+1 subframes for asynchronous intraband NE-DC, 1 subframe for synchronous interband NE-DC or 2 subframes for asynchronous interband NE-DC. For SCell activation X1 is equal to the duration of the SMTC of the NR SCell being activated + 1 ms. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and $T_{SMTC\ duration}$ for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, $T_{SMTC\ duration}$ for the SCell being activated is 0ms.

- The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell deactivation X1 is equal to 1 ms.

When multiple NR SCells in MCG is activated or deactivated by a single MAC CE

- an interruption on PSCell or activated SCell in SCG shall not exceed X1 subframes if the PSSCell or activated SCell is in the same band as any of the NR SCell being activated with synchronous NE-DC, X1+1 subframes if the PSCell or activated SCell is in the same band as any of the NR SCell being activated with asynchronous NE-DC, 1 subframe if the PSCell or activated SCell is not the same band as any of the NR SCell being activated with synchronous NE-DC, or 2 subframes if the PSCell or activated SCell is not the same band as any of the NR SCell being activated with asynchronous NE-DC. For SCell activation X1 is equal to the longest duration of the SMTC of the NR SCells being activated in the same band as the interrupted cell + 1 ms. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot. For SCell deactivation X1 is equal to 1ms.

### 7.36.2.5 Interruptions during measurements on SCC

#### 7.36.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PSCell or other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 7.32.2.6.1, where the term PCell and EN-DC in clause 8.2.2.2.3 shall be deemed to be replaced with PSCell and NE-DC, respectively.

#### 7.36.2.5.2 Interruptions during measurements on deactivated E-UTRA SCC

PSCell interruptions due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. Each interruption shall not exceed:

- 1 subframes if the PSCell is not in the same band as the deactivated SCell

- 5 subframes if the PSCell is in the same band as the deactivated SCell

SCell interruptions due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. Each interruption shall not exceed:

- 1 subframes if the SCell is not in the same band as the deactivated SCell

- 5 subframes if the SCell is in the same band as the deactivated Scell

#### 7.36.2.5.3 Interruptions during CQI measurements on dormant E-UTRA SCell

PSCell interruptions due to CQI measurements when an SCell is dormant are allowed as defined in clause 7.8.2.17.

#### 7.36.2.5.4 Interruptions during RRM measurements on dormant E-UTRA SCC

PSCell and SCell interruptions due to RRM measurements when an SCell is dormant are allowed as defined in

- clause 7.8.2.18 if PSCell and/or activated SCell are in the same band as the dormant SCell

- clause 7.8.2.19 if PSCell and/or activated SCell are not in the same band as the dormant SCell

### 7.36.2.6 Interruptions at active BWP switching

The requirements in this clause shall apply for the UE configured with LTE PSCell only or with LTE PSCell and one or more LTE SCells. The requirements in this section apply to the case that the BWP switch is performed on a single CC or multiple CCs.

When either of the DCI-based, timer-based or RRC-based downlink BWP switch and/or uplink BWP switch occur on multiple CCs simultaneously or over partially overlapping period, the interruption requirements described in this section apply for each BWP switch.

DCI-based or timer-based downlink BWP and/or uplink BWP switching due to change in any of the parameters listed in Table 8.2.2.2.5-2 in TS 38.133 [50] or SCS on NR PCell or on any NR SCell may cause an interruption on PSCell or on activated SCell(s) in the SCG. Interruptions are not allowed during BWP switch involving other parameter change.

Uplink BWP switching on a NR PCell triggered by consistent uplink LBT failures on the NR PCell may cause an interruption on PCell or on activated SCell(s) in the MCG.

The starting time of interruption due to DCI-based or timer-based downlink BWP and/or uplink BWP switching or due to uplink BWP switching on a NR PCell triggered by consistent uplink LBT failures on the NR PCell is only allowed within the BWP switching delay $T_{BWPswitchDelay}$ as defined in clause 8.6.2 of TS 38.133 [50] when BWP switch occurs on a single CC. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay $T_{MultipleBWPswitchDelay}$ +Y as defined in clause 8.6.2A.1 of TS 38.133 [50] when DCI-based BWP switch occurs on multiple CCs. The starting time of interruption caused by each BWP switch is only allowed within the BWP switch delay $T_{MultipleBWPswitchDelay}$ as defined in clause 8.6.2B.1 of TS 38.133 [50] when timer-based BWP switch occurs on multiple CCs simultaneously or $T_{MultipleBWPswitchDelayTotal}$ as defined in clause 8.6.2B.2 of TS 38.133 [50] when timer-based BWP switch occurs on multiple CCs over partially overlapping time period.

RRC-based downlink BWP and/or uplink BWP switching due to change in any of the parameters listed in Table 8.2.1.2.7-2 of TS 38.133 [50] or SCS in NR PSCell or in any NR SCell may cause an interruption on PCell or on activated SCell(s) in the MCG. Interruptions are not allowed during BWP switch involving other parameter change.

The interruption due to RRC-based downlink BWP and/or uplink BWP switching is allowed anywhere within the BWP switching delay ($T_{RRCprocessingDelay}$ + $T_{BWPswitchDelayRRC}$) defined in clause 8.6.3 of TS 38.133 [50] when BWP switch occurs on a single CC. The interruption is only allowed within the delay $T_{RRCprocessingDelay}$ + $T_{BWPswitchDelayRRC}$ + $D_{RRC}$*(N-1) as defined in clause 8.6.3A of TS 38.133 [50] when BWP switch occurs on multiple CCs. The interruption due to RRC-based downlink BWP and/or uplink BWP switching defined in this clause is applicable provided that:

- the RRC reconfiguration requires the UE to only switch its active BWP and

**Table 7.36.2.6-1: Void**

When BWP switch involves SCS changes,

> the UE is allowed to cause interruption on PCell or on any activated SCell(s) regardless of the frequency range of the NR PCell or NR SCell on which the BWP switching occurs.

Otherwise,

> the UE capable of per UE measurement gap [2] is allowed to cause interruption on PSCell or on any activated SCell(s) regardless of the frequency range of the NR PCell or NR SCell on which the BWP switching occurs;
>
> the UE capable of per FR measurement gap [2] is allowed to cause interruption on PSCell or on any activated SCell(s) provided that the NR PCell or NR SCell on which the BWP switching occurs belongs to FR1.

The interruption on PSCell or on any activated SCell(s) shall not exceed:

- 1 subframe in synchronous NE-DC,
- 2 subframes in asynchronous NE-DC.

### 7.36.2.7 Interruptions at SCell activation and deactivation of dormant SCell

When one dormant SCell belonging to SCG is activated and deactivated, UE is allowed interruptions on PSCell and any activated SCell(s) as defined in

- clause 7.8.2.14 if PSCell and/or activated SCell are in the same band as the dormant SCell
- clause 7.8.2.15 if PSCell and/or activated SCell are not in the same band as the dormant SCell

### 7.36.2.8 Interruptions at SCell activation and deactivation of multiple dormant SCell

When any number of SCells in a dormant state between one and six is activated and deactivated using the same MAC control element as defined in TS 36.321 [17], UE is allowed interruptions on PSCell and any activated SCell(s) as defined in clause 7.8.2.16.

### 7.36.2.9 Interruptions at SCell hibernation

When any number of SCells in activated or deactivated state between one and six is hibernated using the same MAC control element as defined in TS 36.321 [17], UE is allowed interruptions on PSCell and any activated SCell(s) as defined in clause 7.8.2.20.

### 7.36.2.10 Interruptions at direct SCell activation and hibernation

When any number of SCells between one and M is directly activated or hibernated using the same RRC message as defined in TS 36.331 [2], UE is allowed interruptions on PSCell and any activated SCell(s) as defined in clause 7.8.2.21.

When one or multiple NR SCell(s) belonging to MCG are directly activated

- an interruption on PSCell or activated SCell in SCG shall not exceed X1 subframes for synchronous intraband NE-DC, X1+1 subframes for asynchronous intraband NE-DC, 1 subframe for synchronous interband NE-DC or 2 subframes for asynchronous interband NE-DC. For direct SCell activation X1 is equal to the duration of the SMTC of the NR SCell being activated + 1 ms. The interruption is based on assumption that the cell specific reference signals from both cells are available in the same slot.

### 7.36.2.11 Interruptions at NR SRS carrier based switching

NR SRS , defined in TS 38.215 [58], can be configured on a carrier not configured for PUCCH/PUSCH transmission. When a UE needs to transmit periodic, semi-persistent or aperiodic NR SRS on a NR carrier of a serving cell not configured for PUCCH/PUSCH transmission, the UE can perform carrier based switching to one or more carriers not configured for PUCCH/PUSCH transmission from a carrier with PUCCH/PUSCH transmission or from a carrier not configured for PUCCH/PUSCH transmission prior to transmitting the NR SRS, provided that:

- switching is from a configured NR carrier to an active BWP of another activated NR carrier;
- the carrier of SCells not configured for PUCCH/PUSCH transmission to which NR SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic NR SRS transmission, or indicated by MAC-CE for semi-persistent NR SRS transmission, or configured via RRC for periodic NR SRS transmission;
- the serving cell, from which NR SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by *srs-SwitchFromServCellIndex* and *srs-SwitchFromCarrier* in TS38.331 [38];
- the NR SRS switching is not colliding with any other transmission with higher priority defined in TS 38.214 [51] ;
- the NR SRS switching is not colliding with any measurements in MCG.
- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 38.331 [38], and is compliant to the requirements for inter-band CA with uplink in one NR band and without simultaneous Rx/Tx specified in TS 38.101 [52], the NR SRS transmissions are not simultaneously scheduled with DL SSB/ CSI-RS for L3 or L1 measurements on other carriers.

The UE shall not perform NR SRS carrier based switching if the above conditions cannot be met.

The interruption on PSCC and each of the activated SCCs during the NR SRS carrier switching to the NR SCC not configured for PUCCH/PUSCH transmission shall not exceed X2 subframes including the first subframe where NR SRS transmission is configured on the NR SCC not configured for PUCCH/PUSCH transmission.

The interruption on PSCC and each of the activated SCCs during the NR SRS carrier switching from the NR SCC not configured for PUCCH/PUSCH transmission shall not exceed X2 subframes including the last subframe where NR SRS transmission is configured on the NR SCC not configured for PUCCH/PUSCH transmission.

**Table 7.36.2.11-1: Interruption length X2 at NR SRS carrier based switching**

| NR SRS carrier switching time (us)[note1] | Interruption length X2 (subframes) |
|---|---|
| ≤500 | 2 |
| 900 | 3 |

Note1: NR SRS carrier switching time is UE capability indicated by higher layer parameter *SRS-SwitchingTimeNR*.

## 7.36.2.12 Interruptions at NR SCell dormancy

### 7.36.2.12.1 Interruptions due to NR SCell dormancy switch

When one NR SCell in MGC is switched from dormancy to non-dormancy or from non-dormancy to dormancy [43] when UE is in DRX active time in MCG,

- the UE is allowed an interruption on any active serving cell in SCG as defined in clause 7.36.2.6, except that the interruption is allowed regardless of which parameters change between the dormant BWP and the non-dormant BWP.

- If the UE is not capable of per-FR gap, or if the dormancy switching involves SCS changing, the interruption is allowed to active serving cell in SCG regardless of the frequency range of the NR SCell on which the dormancy switching occurs. If the UE is capable of per-FR gap and the the dormancy switching does not involve SCS changing, UE is allowed to cause interruption to active serving cells in SCG provided that the NR SCell on which the dormancy switching occurs belongs to FR1.

- The starting time of interruption is only allowed within the dormancy switching delay as defined in clause 8.6.2 of TS 38.133 [50].

When more than one NR SCells in MGC are switched from dormancy to non-dormancy or from non-dormancy to dormancy [43] simultaneously when UE is in DRX active time in MCG, the interruption requirements described above apply for dormancy switch on each SCell in MCG.

### 7.36.2.12.2 Interruptions due to CSI and RRM measurements during SCell dormancy

When one or more NR SCells in MCG are in dormancy, the UE is allowed to cause interruptions on active E-UTRA serving cells due to CSI and RRM measurements on the NR SCell(s) in dormancy.

The rate of ACK/NACK feedback loss on any active E-UTRA serving cell resulting from CSI and RRM measurements on NR SCells in dormancy shall not exceed 0.5% and 1.0%, respectively.

## 7.36.2.13 Interruption during E-UTRA measurement with autonomous gaps

When UE is configured by NR PCell to identify CGI of an E-UTRA FDD or E-UTRA TDD cell, UE may cause interruptions on PSCell, and SCell(s) in SCG if configured.

During the time period of $T_{identify_CGI,\ E\text{-}UTAN}$ as specified in clause 9.4.7 of TS 38.133 [50], over which the UE identifies the new CGI of the E-UTRA cell, the UE shall transmit at least 60 ACK/NACKs on FDD PSCell and each of activated FDD SCell(s), and at least $N_{ACK/NACK}$ ACK/NACKs on TDD PSCell and each of activated TDD SCell(s) where $N_{ACK/NACK}$ is specified in Table 7.36.2.13-1, provided that

- there is continuous DL data allocation,

- no DRX and no eDRX_CONN cycle is used,

- no measurement gaps are configured,

- only one code word is transmitted in each subframe,

- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

**Table 7.36.2.13-1: Number of ACK/NACKs transmitted by the UE during the time for identification of CGI of an E-UTRA cell**

| UL/DL configuration | Minimum number of transmitted ACK/NACKs |
|---|---|
| 0 (Note 1) | 18 |
| 1 | 35 |
| 2 | 43 |
| 3 | 36 |
| 4 | 39 |

| | |
|---|---|
| 5 | 42 |
| 6 | 30 |
| Note 1: When a UE is configured with EIMTA-*MainConfigServCell* via RRC signalling [2] only this requirement shall apply. | |

### 7.36.2.14 Interruption during NR measurement with autonomous gaps

When UE is configured by NR PCell to identify CGI of an NR cell, UE may cause interruptions on PSCell, and SCell(s) in SCG if configured.

- up to K1 interruptions, each with up to X1 interrupted subframes, during MIB decoding time period $T_{MIB}$ specified in clause 9. 11 of TS 38.133 [50],
- up to L1 interruptions, each with up to Y1 interrupted subframes, during SIB1 decoding time period $T_{SIB1}$ specified in clause 9. 11 of TS 38.133 [50], for SSB and CORESET for RMSI scheduling multiplexing patterns 1,
- up to L2 interruptions, each with up to Y2 interrupted subframes, during SIB1 decoding time period $T_{SIB1}$ specified in clause 9. 11 of TS 38.133 [50], for SSB and CORESET for RMSI scheduling multiplexing patterns 2 and 3,

where K1, L1, L2, X1, Y1 and Y2 are as defined in 8.2.1.2. 16 of TS 38.133 [50] assuming $\mu$=0 for victim cell.

### 7.36.2.15 Interruptions at SRS carrier based switching

A PUSCH-less SCC is a TDD SCC without PUCCH/PUSCH configured. When a UE needs to transmit periodic or aperiodic SRS [16] and/or non-contention based PRACH on a PUSCH-less SCC, the UE can perform carrier based switching to one or more PUSCH-less SCCs from a CC with PUSCH or from another PUSCH-less SCC prior to transmitting SRS and/or PRACH, provided that:

- switching is from a configured CC to another activated TDD CC;
- the PUSCH-less SCCs to which SRS carrier based switching is performed is indicated by DCI SRS request field for aperiodic SRS transmission or configured via RRC [2] for periodic SRS transmission or indicated by PDCCH for PRACH;
- the serving cell, from which SRS carrier based switching is performed and whose UL transmission may therefore be interrupted, is indicated by srs-SwitchFromServCellIndex [2];
- the SRS switching is not colliding with any other transmission with higher priority defined in [3];
- the SRS switching is not colliding with PDCCH in subframe 0 and 5 as specified in [3];
- for UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], the SRS or RACH transmission are not simultaneously scheduled with DL subframe #0 or DL subframe #5 on other CCs.

The UE shall not perform SRS carrier based switching if the above conditions cannot be met.

The interruption on PSCC and each of the activated SCCs during the switching to the PUSCH-less SCC shall not exceed 2 subframes including the first subframe where SRS transmission is configured on the PUSCH-less SCC.

The interruption on PSCC and each of the activated SCCs during the switching from the PUSCH-less SCC shall not exceed 2 subframes including the last subframe where SRS transmission is configured on the PUSCH-less SCC.

## 7.37 Interruptions during NR measurement with autonomous gaps

### 7.37.1 Introduction

This section contains the requirements for the interruptions on PCell and activated SCells if configured, when performing inter-RAT NR measurement with autonomous gaps cells.

### 7.37.2 Requirements

When a UE is identifying CGI of an NR cell with autonomous gaps as configured by PCell, the UE is allowed on PCell or any activated SCell if configured

- up to K1 interruptions, each with up to X1 interrupted subframes, during MIB decoding time period $T_{MIB_NR}$ specified in clause 8.1.2.4. 27.2 and 8.1.2.4. 28.2,
- up to L1 interruptions, each with up to Y1 interrupted subframes, during SIB1 decoding time period $T_{SIB1_NR}$ specified in clause 8.1.2.4. 27.2 and 8.1.2.4. 28.2, for SSB and CORESET for RMSI scheduling multiplexing patterns 1,
- up to L2 interruptions, each with up to Y2 interrupted subframes, during SIB1 decoding time period $T_{SIB1_NR}$ specified in clause 8.1.2.4. 27.2 and 8.1.2.4. 28.2, for SSB and CORESET for RMSI scheduling multiplexing patterns 2 and 3,

where K1, L1, L2, X1, Y1 and Y2 are as defined in 8.2.1.2. 16 of TS 38.133 [50] assuming $\mu$=0 for victim cell.

# 8 UE Measurements Procedures in RRC_CONNECTED State

## 8.1 General Measurement Requirements

### 8.1.1 Introduction

This clause contains requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are split in E-UTRA intra frequency, E-UTRA inter frequency, Inter-RAT UTRA FDD, UTRA TDD and GSM measurements. These measurements may be used by the E-UTRAN, e.g. for handover decisions. The measurement quantities are defined in [4], the measurement model is defined in [22] and measurement accuracies are specified in clause 9. Control of measurement reporting is specified in TS 36.331 [2].

When the UE is provided with IDC solution, the UE shall also perform RRM measurements and meet the corresponding requirements in clause 8.

In the requirements of Section 8.1 for the UE capable of CA and the UE configured with up to six SCells, the applicable exceptions for side conditions are specified in Annex B, Sections B.4.2 and B.4.3, respectively.

In the requirements of Section 8.1 for the UE capable of DC and the UE configured with one PSCell, the applicable exceptions for side conditions are specified in Annex B, Sections B.4.2 and B.4.3, respectively.

The requirements in Section 9 are applicable for a UE performing measurements according to Section 8.1.

### 8.1.2 Requirements

#### 8.1.2.1 UE measurement capability

If the UE requires measurement gaps to identify and measure inter-frequency and/or inter-RAT cells and the UE does not support perServingCellMeasurementGap-r14 or is not configured with per serving cell measurement gaps, in order for the requirements in the following subsections to apply the E-UTRAN must provide a single measurement gap pattern with constant gap duration for concurrent monitoring of all frequency layers and RATs. If the UE requires measurement gaps to identify and measure inter-frequency and/or inter-RAT cells and the UE supports perServingCellMeasurementGap-r14 and is configured with per serving cell measurement gaps, in order for the requirements in the following subsections to apply the E-UTRAN must provide gap pattern(s) on at least each serving component carrier (per-CC) where the UE has indicated in the *perCC-ListGapIndication* IE that gaps are required. No gap pattern is required to be provided on the serving component carrier where UE has indicated in the the *perCC-ListGapIndication* IE that gaps are not required. The requirements apply if the gap on each serving cell is at least that which the UE has indicated with gapIndication in the *perCC-ListGapIndication* IE, and if the gapOffset, MGRP and MGL are the same for each serving component carrier. During the measurement gaps the UE:

During the measurement gaps the UE:

- shall not transmit any data
- is not expected to tune its receiver on any of the E-UTRAN carrier frequencies of PCell and any SCell.
- is not expected to tune its receiver on any of the E-UTRAN carrier frequencies of PCell, PSCell, and SCell.

If the UE supporting dual connectivity is configured with PSCell, during the total interruption time as shown in Figure 8.1.2.1-1, the UE shall not transmit and receive any data in SCG.

In addition, for UE supporting E-UTRA-NR dual connectivity, if MG timing advance of 0.5ms is applied, the UE:

- shall not transmit any data
- is not expected to tune its receiver on any of the E-UTRAN carrier frequencies of PCell and any SCell.
- is not expected to tune its receiver on any of the E-UTRAN carrier frequencies of PCell, PSCell, and SCell.

in subframes fully or partially overlapping with the measurement gaps on E-UTRAN serving cells. The total interruption time on E-UTRAN serving cells is (MGL+1) subframes.

When MG timing advance of 0.5 ms is not applied, in the uplink subframe occurring immediately after the measurement gap,

- if the following conditions are met then it is up to UE implementation whether or not the UE can transmit data:
  - all the serving cells belong to E-UTRAN TDD;
  - the measurement objects do not include any NR carrier frequency;
  - if the subframe occurring immediately before the measurement gap is an uplink subframe.
- Otherwise the UE shall not transmit any data.

When MG timing advance of 0.5 ms is applied, in the uplink subframe occurring immediately after the subframe partially overlapped with measurement gap,

- it is up to UE implementation whether or not the UE can transmit data

In determining the above UE behaviour in the uplink subframe occurring immediately after the measurement gap or after the subframe partially overlapped with measurement gap,the UE shall treat a special subframe as an uplink subframe if the special subframe occurs immediately before the measurement gap.

Inter-frequency and inter-RAT measurement requirements within this clause rely on the UE being configured with one measurement gap pattern unless the UE has signaled that it is capable according to the capability interFreqNeedForGaps or interRATNeedForGaps of conducting such measurements without gaps and without interruption. UEs shall only support those measurement gap patterns listed in Table 8.1.2.1-1 and table 8.1.2.1.-2 that are relevant to its measurement capabilities. UEs supporting network controlled small gap and which have signaled that they are capable of measurements without gap but requiring NCSG, can be configured with a network controlled small gap pattern in table 8.1.2.1.3-1 on all component carrier(s) to perform inter-frequency and inter-RAT measurement.

ProSe capable UE is allowed to perform ProSe transmissions during the measurement gaps that are not used for measurements if the requirements specified in section 8 for inter-frequency and inter-RAT measurements are fulfilled.

In E-UTRA-NR dual connectivity mode, NR - E-UTRAdual connectivity mode and E-UTRA standalone mode, all gap patterns #0~11 in Table 8.1.2.1-1 can be configured for measurements of NR carriers only, and gap pattern#0, 1, 2, 3, 4, 6, 7, 8, 10 can be configured for measurements of E-UTRA carriers with the applicability as specified in Table 8.1.2.1-1.

**Table 8.1.2.1-1: Gap Pattern Configurations supported by the UE**

| Gap Pattern Id | MeasurementGap Length (MGL, ms) | Measurement Gap Repetition Period (MGRP, ms) | Minimum available time for inter-frequency and inter-RAT measurements during 480ms period (Tinter1, ms) | Measurement Purpose |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 0 | 6 | 40 | 60 | Inter-Frequency E-UTRAN FDD and TDD, UTRAN FDD, GERAN, LCR TDD, HRPD, CDMA2000 1x, inter-RAT NR |
| 1 | 6 | 80 | 30 | Inter-Frequency E-UTRAN FDD and TDD, UTRAN FDD, GERAN, LCR TDD, HRPD, CDMA2000 1x, inter-RAT NR |
| 2 | 3 | 40 | 24 NOTE 1,2 | Inter-Frequency E-UTRAN FDD and TDD for cells with time difference as specified below. inter-RAT NR |
| 3 | 3 | 80 | 12 NOTE 1,2 | Inter-Frequency E-UTRAN FDD and TDD for cells with time difference according as specified below. inter-RAT NR |
| 4 | 6 | 20 | 120 Note 1 | inter-RAT NR, Inter-Frequency E-UTRAN FDD and TDD Note 6 |
| 5 | 6 | 160 | Note 3 | inter-RAT NR |
| 6 | 4 | 20 | 72 Note 1, 5, 7 | inter-RAT NR, Inter-Frequency E-UTRAN FDD and TDD Note 6 |
| 7 | 4 | 40 | 36 Note 1, 5, 8 | inter-RAT NR, Inter-Frequency E-UTRAN FDD and TDD Note 6 |
| 8 | 4 | 80 | 18 Note 1, 5, 9 | inter-RAT NR, Inter-Frequency E-UTRAN FDD and TDD Note 6 |
| 9 | 4 | 160 | Note 3 | inter-RAT NR |
| 10 | 3 | 20 | 48 Note 1, 5 | inter-RAT NR, Inter-Frequency E-UTRAN FDD and TDD Note 6 |
| 11 | 3 | 160 | Note 3 | inter-RAT NR |
| 24 | 10 | 80 | 54 Note 1 | Inter-Frequency E-UTRAN FDD and TDD Note 11 |
| 25 | 20 | 160 | Note 3 | Note 11 |

NOTE 1: When determing UE requirements using Tinter1 for GP2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for GP2, GP4, GP6, GP7, GP10 and Tinter1 = 30 for GP3, GP8 and GP24 shall be used.
NOTE 2: Void.
NOTE 3: This gap pattern can be used only for measurement of NR carriers, and Tinter is not applicable.
NOTE 4: Void
NOTE 5: Void.
NOTE 6: This gap pattern is supported by UEs which are configured to perform both E-UTRA inter-frequency measurement and inter-RAT NR measurement or supported by UEs configured to perform inter-RAT NR measurement only.
NOTE 7: When this gap pattern is used, the $T_{inter}$ for E-UTRA interfrequency measurements is 48ms corresponding to the first 3ms of the 4ms gap
NOTE 8: When this gap pattern is used, the $T_{inter}$ for E-UTRA interfrequency measurements is 24ms corresponding to the first 3ms of the 4ms gap
NOTE 9: When this gap pattern is used, the $T_{inter}$ for E-UTRA interfrequency measurements is 12ms corresponding to the first 3ms of the 4ms gap
NOTE 10: For UE only supporting *measGapPatterns-NRonly-r16* for the corresponding gap patterns among GP2-11, the corresponding gap patterns are only applicable to measurement of inter-RAT NR.
NOTE 11: Measurement gap patterns #24 and #25 can be requested by NR PCell [38] only when the UE is configured at least with any of RSTD, UE Rx-Tx, or PRS-RSRP measurements requiring such gaps and can only be used during the corresponding positioning measurement period

**Table 8.1.2.1-2: Gap Pattern Configurations for UE supporting low density burst gap pattens**

| Gap Pattern Id | MeasurementGap Length (MGL, ms) | Measurement Gap Repetition Period (MGRP, ms) | Number of gaps per burst | Burst repetition period $T_{burst}$ | Measurement Purpose |
|---|---|---|---|---|---|
| nonUniform1 | 6 | 40 | 13 | 1.28s | Inter-Frequency E-UTRAN FDD and TDD |
| nonUniform2 | 6 | 40 | 13 | 2.56s | Inter-Frequency E-UTRAN FDD and TDD |
| nonUniform3 | 6 | 40 | 13 | 5.12s | Inter-Frequency E-UTRAN FDD and TDD |
| nonUniform4 | 6 | 40 | 13 | 10.24s | Inter-Frequency E-UTRAN FDD and TDD |
| NOTE 1: When determing UE requirements nonUniform1, nonUniform2, nonUniform3 or nonUniform4, 60ms shall be assumed as the minimum available time for inter-frequency and inter-RAT measurements during each burst.. NOTE 2: The Gap patterns nonUniform1, nonUniform2, nonUniform3 and nonUniform4 cannot be be combined with IncMon reduced performance group | | | | | |

NOTE 1: When inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern 0 can be used. For defining the inter-frequency and inter-RAT requirements $T_{inter1}$=30ms shall be assumed.

NOTE 2: A measurement gap starts at the end of the latest subframe occurring immediately before the measurement gap among MCG serving cells subframes. If the measurement objects include at least one NR carrier frequency, the measurement gap starts at time $T_{MG}$ ms if configured advanced to the end of the latest DL E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells.

NOTE 2a: In EN-DC mode, the measurement gap starts at time $T_{MG}$ ms if configured advanced to the end of the latest E-UTRA DL subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

NOTE 2b: In NE-DC mode,

- if per-UE measurement gap is configured with MG timing advance of $T_{MG}$ ms, the measurement gap starts at time $T_{MG}$ ms advanced to the end of the latest NR DL subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

- if per-FR measurement gap for FR1 is configured with MG timing advance of $T_{MG}$ ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time $T_{MG}$ ms advanced to the end of the latest NR DL subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.

- if per-FR measurement gap for FR1 is configured with MG timing advance of $T_{MG}$ ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time $T_{MG}$ ms advanced to the end of the latest DL E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.

  $T_{MG}$ is the MG timing advance value provided in mgta according to TS 36.331 [2].

NOTE 3: MGL is the time from start of tuning to end of retuning, which is aligned between MCG and SCG.

NOTE 4: For GP0 and GP1 The total interruption time on SCG is 6 subframes for synchronous dual connectivity, and the total interruption time on SCG is 7 subframes for asyncrhonous dual connectivity. As shown in Figure 8.1.2.1-1, MCG subframes from $i$+1 to $i$+6 are included in total interruption time together with SCG subframes from $j$+1 to $j$+6 for synchronous dual connectivity and $j$+1 to $j$+7 for asyncrhonous dual connectivity.

NOTE 5: For GP0 and GP1 and asynchronous dual connectivity as shown in Figure 8.1.2.1-1 (b), subframe $j$ is regarded as the subframe occurring immediately before the measurement gap for SCG, similarly, subframe $j$+8 is regarded as the subframe occurring immediately after the measurement gap for SCG.

NOTE 6: For GP2 and GP3 the total interruption time on SCG is 3 subframes for synchronous dual connectivity, and the total interruption time on SCG is 4 subframes for asyncrhonous dual connectivity. The total interrupt is applied in same spirit as shown in Figure 8.1.2.1-1. I.e. For MCG subframes from *i*+1 to *i*+3 are included in total interruption time together with SCG subframes from *j*+1 to *j*+3 for synchronous dual connectivity and *j*+1 to *j*+4 for asyncrhonous dual connectivity.

NOTE 7: For GP2 and GP3 and asynchronous dual connectivity as shown in Figure 8.1.2.1-1 (b) with measurement gap length 3, subframe *j* is regarded as the subframe occurring immediately before the measurement gap for SCG, similarly, subframe *j*+5 is regarded as the subframe occurring immediately after the measurement gap for SCG.

NOTE 8: nonUniform1 – nonUniform4 gap patterns are shown in figure 8.1.2.1-2. A burst repetition period $T_{burst}$ is consisted of T1 and T2. During T1, UE performs measurement during the gap. During T2, UE suspends measurement gap. Both UE and eNB can assume there is no gap during T2. T1 equals to number of gaps per burst in Table 8.1.2.1-2. $T_{burst}$ is configured by the higher layers.For nonUniform1 – nonUniform4 the total interruption time on SCG is same as for GP0 and GP1 for both synchronous and asynchronous dual connectivity as shown in Figure 8.1.2.1-1. For asynchronous dual connectivity as shown in Figure 8.1.2.1-1 (b), subframe *j* is regarded as the subframe occurring immediately before the measurement gap for SCG, similarly, subframe *j*+8 is regarded as the subframe occurring immediately after the measurement gap for SCG.

NOTE 9: When UE is in NE-DC, the total interruption time on SCG is MGL subframes for synchronous NE-DC, and the total interruption time on SCG is (MGL+1) subframes for asyncrhonous NE-DC. Subframe occurring immediately before the measurement gap for SCG is the latest subframe in SCG which is before and fully non-overlapped with the measurement gap, similarly, subframe occurring immediately after the measurement gap for SCG is the earliest subframe in SCG which is after and fully non-overlapped with the measurement gap.

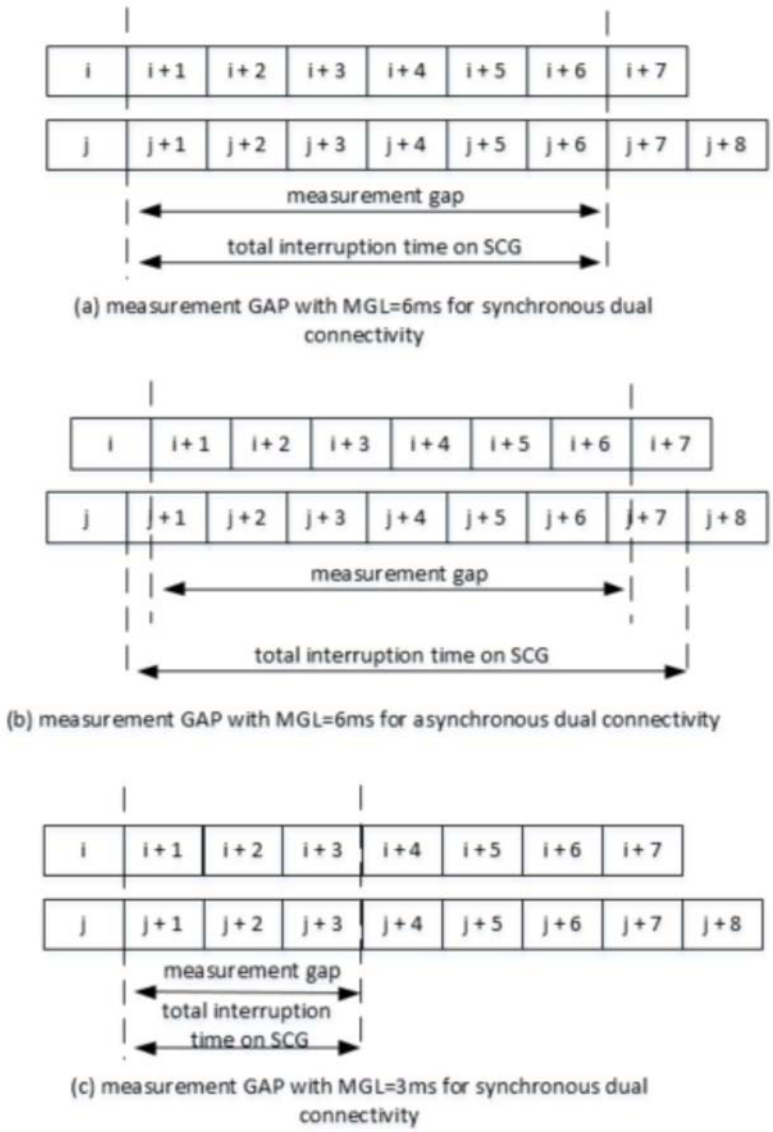


**Figure 8.1.2.1-1: Measurement GAP and total interruption time on MCG and SCG**

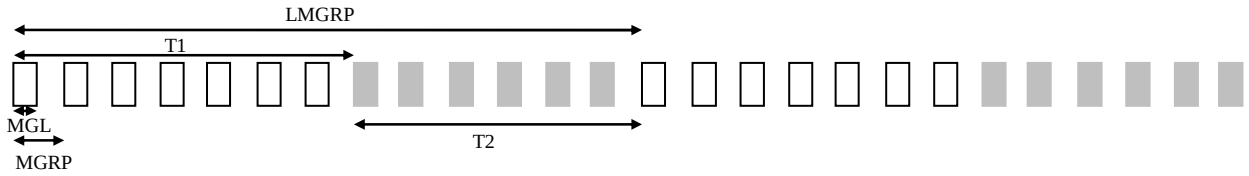


**Figure 8.1.2.1-2: Non-uniform gap pattern**

A UE that is capable of identifying and measuring inter-frequency and/or inter-RAT cells without gaps shall follow requirements as if Gap Pattern Id #0 had been used and the minimum available time Tinter1 of 60 ms shall be assumed for the corresponding requirements.

A UE configured with gap pattern Id 2, 3 or 10, shall be able to detect a target cell if the sub frame #0 or #5 of the target cell begins no earlier than 500uS from the start of the measurement gap and if the sub frame #0 or #5 of the target cell ends no later than 500uS before the end of the measurement gap in case of FDD, and no later than [750]us before the end of measurement gap in case of TDD.

A UE configured with gap pattern Id 6, 7 or 8 shall be able to detect a target cell if the sub frame #0 or #5 of the target cell begins no earlier than 500uS from the start of the measurement gap and if the sub frame #0 or #5 of the target cell

ends no later than 1500uS before the end of the measurement gap in case of FDD, and no later than 1750us before the end of measurement gap in case of TDD.

If the UE supporting E-UTRA carrier aggregation when configured with up to six SCCs is performing measurements on cells on PCC, inter-frequency measurements, or inter-RAT measurements, and interruption occurs on PCell or any activated SCell or both due to measurements performed on cells on an SCC with a deactivated SCell according to section 8.3, then the UE shall meet the requirements specified for each measurement in Section 8 and Section 9.

If the UE supporting E-UTRA dual connectivity when configured with a PSCell is performing measurements on cells on PCC, inter-frequency measurements, or inter-RAT measurements, then the UE shall meet the requirements specified for each measurement in Section 8 and Section 9.

A UE which indicate support for Increased UE carrier monitoring E-UTRA according to the capabilities in [2, 31] and which is capable of identifying and measuring inter-frequency and/or inter-RAT cells without gaps, shall be able to monitor maximum number of layers as defined in 8.1.2.1.1.1a, and apply the *MeasScaleFactor* [2] defining the relaxation to the requirements for the configured carriers according to section 8.1.2.1.1a.

A UE configured via LPP [24] to perform RSTD measurements requiring measurement gaps and provided with the OTDOA assistance data, which is comprising at least one PRS configuration with $N_{PRS}$ >6 consecutive downlink positioning subframes defined in TS 36.211 [16] in at least one cell, can be configured for performing the RSTD measurements with the following measurement gap patterns and shall not be used outside the corresponding RSTD measurement period:

- measurement gap pattern with Id 0 specified in Table 8.1.2.1-1, or
- an applicable measurement gap pattern specified in Table 8.1.2.1-3, provided the following conditions are met:
  - the UE is Cat M1 or Cat M2 UE, and
  - the applicability conditions are met for the UE.

**Table 8.1.2.1-3: Additional Measurement Gap Pattern Configurations supported by the UE**

| Gap Pattern Id | Measurement Gap Length (MGL, ms) | Measurement Gap Repetition Period (MGRP, ms) | Applicability |
|---|---|---|---|
| rstd0 | 10 | 80 | NOTE 1, 2 |
| rstd1 | 10 | 160 | |
| rstd2 | 10 | 320 | |
| rstd3 | 10 | 640 | |
| rstd4 | 10 | 1280 | |
| rstd5 | 14 | 160 | NOTE 1, 2 |
| rstd6 | 14 | 320 | |
| rstd7 | 14 | 640 | |
| rstd8 | 14 | 1280 | |
| rstd9 | 24 | 320 | NOTE 1, 2 |
| rstd10 | 24 | 640 | |
| rstd11 | 24 | 1280 | |
| rstd12 | 32 | 320 | NOTE 1, 2 |
| rstd13 | 32 | 640 | |
| rstd14 | 32 | 1280 | |
| rstd15 | 54 | 640 | NOTE 2 |
| rstd16 | 54 | 1280 | |
| rstd17 | 64 | 640 | NOTE 2 |
| rstd18 | 64 | 1280 | |
| rstd19 | 80 | 640 | NOTE 3 |
| rstd20 | 80 | 1280 | |

NOTE 1: For FDD, (MGL-2) shall not be larger than the required minimum number of available measurement subframes specified in Section 9 in the corresponding RSTD measurement accuracy requirements.
NOTE 2: For TDD, the number of DL subframes within the available measurement time of the measurement gap shall not be larger than the required minimum number of available measurement subframes specified in Section 9 in the corresponding RSTD measurement accuracy requirements.
NOTE 3: At least one cell in the OTDOA assistance data is configured with multiple PRS configurations

If the UE is configured with any of the measurement gap patterns specified in Table 8.1.2.1-3 for performing RSTD measurements, using of any other measurement gap pattern configured to the UE is suspended during the RSTD measurement period.

#### 8.1.2.1.1 Monitoring of multiple layers using gaps

When monitoring of multiple inter-frequency E-UTRAN and inter-RAT (UTRAN, GSM, NR) using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (RSRP, RSRQ, RSTD, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, NR SS-RSRP, NR SS-RSRQ, NR SS-SINR, etc.) of detected cells on all the layers

The effective total number of frequencies excluding the frequencies of the PCell, SCells, and PSCell being monitored is $N_{freq}$, which is defined as:

$N_{freq} = N_{freq,\ E\text{-}UTRA} + N_{freq,\ UTRA} + M_{gsm} + N_{freq,\ cdma2000} + N_{freq,\ HRPD} + N_{freq,\ NR}$

where

$N_{freq,\ E\text{-}UTRA}$ is the number of E-UTRA carriers being monitored (FDD and TDD)

$N_{freq,\ UTRA}$ is the number of UTRA carriers being monitored (FDD and TDD)

$M_{GSM}$ is an integer which is a function of the number of GSM carriers on which measurements are being performed. $M_{GSM}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{GSM}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{GSM}$ is equal to ceil($N_{carriers,GSM}$ /20) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

$N_{freq,\ cdma2000}$ is the number of cdma2000 1x carriers being monitored.

$N_{freq,\ HRPD}$ is the number of HRPD carriers being monitored.

$N_{freq,\ NR}$ is the number of NR inter-RAT carriers being monitored.

##### 8.1.2.1.1.1 Maximum allowed layers for multiple monitoring

The UE shall be capable of monitoring at least per RAT group:

- Depending on UE capability, 3 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 1 FDD E-UTRA inter-frequency carrier for RSTD measurements, and
- Depending on UE capability, 3 TDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 1 TDD E-UTRA inter-frequency carrier for RSTD measurements, and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 5 cdma2000 1x carriers, and
- Depending on UE capability, 5 HRPD carriers, and
- Depending on UE capability, 8 NR inter-RAT carriers

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 7 effective carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x, and HRPD layers.

In addition to the requirements defined above, the UE which supports NR inter-RAT measurements or EN-DC but is not configured with NR PSCell shall be capable of monitoring a total of at least 9 effective carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x, HRPD and NR layers.

#### 8.1.2.1.1.1a Maximum allowed layers for multiple monitoring (Increased UE carrier monitoring)

UE which indicate support for Increased UE carrier monitoring E-UTRA according to the capabilities in [2,31] shall be capable of monitoring at least

- Depending on UE capability, 8 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 8 TDD E-UTRA inter-frequency carriers

UE which indicate support for increased UE carrier monitoring UTRA according to the capabilities in [2,31] shall be capable of monitoring at least

- Depending on UE capability, 6 FDD UTRA carriers, and
- Depending on UE capability, 7 TDD UTRA carriers, and

In addition to the requirements defined above, the UE which indicate support for Increased UE carrier monitoring E-UTRA or increased UE carrier monitoring UTRA according to the capabilities in [2,31] shall be capable of monitoring a total of at least 12 carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x and HRPD layers

The minimum performance requirements for a UE which does not indicate support for Increased UE carrier monitoring E-UTRA [2,31] are calculated assuming all E-UTRA carriers which the UE is required to monitor, are having normal performance, i.e. $N_{freq,\ E\text{-}UTRA,reduced}$ =0. The minimum performance requirements for a UE which does not indicate support for Increased UE carrier monitoring UTRA [2,31] are calculated assuming all UTRA carriers which the UE is required to monitor, are having normal performance, i.e. $N_{freq,\ UTRA,reduced}$ =0. Capabilities for number of carriers to monitor for UE which do not support increased carrier monitoring E-UTRA or increased carrier monitoring UTRA are specified in section 8.1.2.1.1.1. A UE which do not indicate support for Increased UE carrier monitoring E-UTRA or UTRAN [2,31] does not have any reduced performance carrier requirements and $K_n$=1.

In addition to the requirements defined above, the UE which indicates support for Increased UE carrier monitoring E-UTRA or increased UE carrier monitoring UTRA according to the capabilities in [2,31], and also supports NR inter-RAT measurement or EN-DC but is not configured with NR PSCell, shall be capable of monitoring a total of at least 14 carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers), cdma2000 1x, HRPD and NR layers.

The minimum performance requirements for a UE configured with inter-RAT NR layers are calculated assuming all E-UTRA carriers which the UE is required to monitor are having normal performance.

#### 8.1.2.1.1a Monitoring of multiple layers using gaps (Increased UE carrier monitoring)

For UE which support increased carrier monitoring E-UTRA or increased carrier monitoring UTRA, the measurement performance for different carriers may be configured by higher layers to be either normal or reduced performance. A measurement scaling factor, *MeasScaleFactor [2]*, defining the relaxation to be applied to the requirements for carriers measured with reduced measurement performance is signalled by higher layers and has the possible settings shown in table 8.1.2.1.1-1.

**Table 8.1.2.1.1-1: Measurement Scaling factor Configurations supported by the UE**

| | *MeasScaleFactor* information element settting | $K_n$ | $K_r$ |
|---|---|---|---|
| sf-EUTRA-cf1 | 8 | 8/7 | 8 |
| sf-EUTRA-cf2 | 16 | 16/15 | 16 |

If no reduced performance group carrier is configured, the UE shall consider all carriers to have normal performance

If no *MeasScaleFactor* is configured, a UE indicating support for increased carrier monitoring E-UTRA or increased carrier monitoring UTRA shall monitor at least the number of carriers specified in section 8.1.2.1.1.1 and is not required to monitor the increased number of carriers specified in section 8.1.2.1.1.1a.

The following definitions are used in the performance requirements:

$N_{freq} = N_{freq,n} + N_{freq,r}$

Where:

$N_{freq,n} = N_{freq,\ E\text{-}UTRA,normal} + N_{freq,\ UTRA,\ normal} + M_{gsm} + N_{freq,\ cdma2000} + N_{freq,\ HRPD}$ : Total number of interfrequency carriers to be monitored with normal measurement performance

$N_{freq,r} = N_{freq,\ E\text{-}UTRA,reduced} + N_{freq,\ UTRA,\ reduced}$ : Total number of interfrequency carriers to be monitored with reduced measurement performance

Where :

$N_{freq,\ E\text{-}UTRA,normal}$ : Number of interfrequency carriers to be monitored with normal performance

$N_{freq,\ E\text{-}UTRA,normal,FDD}$ : Number of interfrequency FDD carriers to be monitored with normal performance

$N_{freq,\ E\text{-}UTRA,normal,TDD\ :}$ Number of interfrequency TDD carriers to be monitored with normal performance

$N_{freq,\ E\text{-}UTRA,reduced}$ : Number of interfrequency carriers to be monitored with reduced performance

$N_{freq,\ UTRA,normal}$ : Number of UTRA carriers (FDD and TDD) to be monitored with normal performance

$N_{freq,\ E\text{-}UTRA,normal,FDD}$ : Number of interfrequency FDD carriers to be monitored with normal performance

$N_{freq,\ E\text{-}UTRA,normal,TDD\ :}$ Number of interfrequency TDD carriers to be monitored with normal performance

$N_{freq,\ UTRA,reduced}$ : Number of UTRA carriers (FDD and TDD) to be monitored with reduced performance

For interfrequency carriers, if $N_{freq,\ E\text{-}UTRA,reduced}$ is not equal to zero then $K_n$ and $K_r$ are as shown in table 8.1.2.1.1-1. Otherwise $K_n$=1 and all interfrequency layers have normal performance.

For UTRAN carriers, if $N_{freq,\ UTRA,reduced}$ is not equal to zero then $K_n$ and $K_r$ are as shown in table 8.1.2.1.1-1. Otherwise $K_n$=1 and all UTRA frequency layers have normal performance.

The minimum performance requirements for a UE which indicates support for Increased UE carrier monitoring E-UTRA [2, 31] are calculated as defined in sections 8.1.2.3.1 and 8.1.2.3.2 provided that $N_{freq,\ E\text{-}UTRA,normal} \leq 3$ for a UE capable of either FDD E-UTRA carrier monitoring or TDD E-UTRA carrier monitoring or $N_{freq,\ E\text{-}UTRA,normal} \leq 6$ for a UE capable of both FDD and TDD E-UTRA carrier monitoring provided $N_{freq,\ E\text{-}UTRA,normal,FDD} \leq 3$ E-UTRA carriers and $N_{freq,\ E\text{-}UTRA,normal,TDD} \leq 3$ TDD E-UTRA carriers or if $N_{freq,n=}\ N_{freq}$. The minimum performance requirements for a UE which indicates support for Increased UE carrier monitoring UTRA [2, 31] are calculated as defined in sections 8.1.2.4.1, 8.1.2.4.3, 8.1.2.4.7 and 8.1.2.4.13 provided that $N_{freq,\ UTRA,normal} \leq 3$ for UE capable of either FDD UTRA carrier monitoring or TDD UTRA carrier monitoring or $N_{freq,\ UTRA,normal} \leq 6$ for a UE capable of both FDD and TDD UTRA carrier monitoring provided $N_{freq,\ UTRA,normal,FDD} \leq 3$ FDD UTRA carriers and $N_{freq,\ UTRA,normal,TDD} \leq 3$ TDD UTRA carriers or if $N_{freq,n=}\ N_{freq}$. Capabilities for number of carriers to monitor for a UE which supports Increased carrier monitoring E-UTRA or Increased carrier monitoring UTRA are specified in section 8.1.2.1.1.1a. Minimum performance requirements as defined in sections 8.1.2.3.1 and 8.1.2.3.2 are not applicable if $N_{freq,r} > 0$ and NR interRAT, NR intrafrequency measurements with gaps or NR interfrequency measurements are configured.

### 8.1.2.1.1b Monitoring of multiple layers using gaps (EN-DC)

The requirements in this section are applicable for EN-DC capable UE, which is configured with NR PSCell.

When monitoring of multiple inter-frequency E-UTRAN and inter-RAT (UTRAN, GSM, NR) carriers as configured by PCell, and inter-frequency NR carriers as configured by NR PSCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (RSRP, RSRQ, RS-SINR, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, NR SS-RSRP, NR SS-RSRQ, NR SS-SINR, NR CSI-RSRP, NR CSI-RSRQ, NR CSI-SINR, etc.) of detected cells on all the layers.

The effective total number of frequencies excluding the frequencies of the PCell, SCells, NR PSCell and NR SCells being monitored is $N_{freq,\ NSA}$, which is defined as:

$N_{freq,\ NSA} = N_{freq,\ NSA,\ E\text{-}UTRA} + N_{freq,\ NSA,\ NR} + N_{freq,\ NSA,\ UTRA} + M_{NSA,\ gsm}$

where

$N_{freq, NSA, E-UTRA}$ is the number of E-UTRA (FDD and TDD) inter-frequency carriers being monitored as configured by PCell

$N_{freq, NSA, NR} \leq N_{freq, NSA, NR, inter-RAT} + N_{freq, NSA, NR, inter-freq}$

where

$N_{freq, NSA, NR, inter-RAT}$ is the number of NR inter-RAT carriers excluding NR serving carrier(s) being monitored as configured by Pcell,

$N_{freq, NSA, NR, inter-freq}$ is the number of NR inter-frequency carriers being monitored as configured by NR PSCell [50] or via LPP [24],

$N_{freq, NSA, UTRA}$ is the number of UTRA inter-RAT carriers being monitored as configured by E-UTRA PCell (FDD and TDD),

$M_{NSA, GSM}$ is an integer which is a function of the number of GSM inter-RAT carriers as configured by E-UTRA PCell on which measurements are being performed. $M_{NSA, GSM}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{NSA, GSM}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{NSA, GSM}$ is equal to ceil($N_{carriers,GSM}$ /20) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

#### 8.1.2.1.1b.1 Maximum allowed layers for multiple monitoring for UE in NSA operation

The UE configured with NR PSCell shall be capable of monitoring at least per RAT group:

- Depending on UE capability, 6 FDD E-UTRA inter-frequency carriers configured by PCell, and
- Depending on UE capability, 6 TDD E-UTRA inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 NR SSB inter-RAT carriers excluding NR serving carrier(s) configured by PCell, and
- Depending on UE capability, 7 NR SSB inter-frequency carriers configured by PSCell [50], and
- Depending on UE capability, 8 NR inter-frequency carriers including SSB and CSI-RS in total configured by NR PSCell [50] , and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 1 FDD E-UTRA inter-frequency carrier for RSTD measurements configured via LPP [24], and
- Depending on UE capability, 1 TDD E-UTRA inter-frequency carrier for RSTD measurements configured via LPP [24].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD, GSM (one GSM layer corresponds to 32 carriers) and NR layers.

The UE shall be capable of monitoring a total of at least 7 + $N_{CSI}$ effective NR carrier frequency layers excluding NR serving carrier(s), comprising of any above defined combination of NR inter-RAT carriers excluding NR serving carrier(s) configured by PCell and NR inter-frequency carriers configured by NR PSCell. $N_{CSI}$ equals 1 if UE supports CSI-RS based L3 measurement, and $N_{CSI}$ =0 otherwise.

When PCell and NR PSCell configure the same NR carrier frequency layer to be monitored by the UE in synchronous intra-band EN-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or

- different SMTC configurations.

NOTE 1: The EN-DC capable UE configured with NR PSCell shall fulfil the requirements defined in only one of Section 8.2.1.1b.1 and Section 9.1.3.2 of TS 38.133 [50].

#### 8.1.2.1.1c Monitoring of multiple layers using gaps (NE-DC)

The requirements in this section are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by PSCell, inter-RAT E-UTRAN carriers as configured by NR PCell, inter-RAT UTRA FDD carriers as configured by NR PCell, and inter-frequency NR carriers as configured by NR PCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (NR SS-RSRP, NR SS-RSRQ, NR SS-SINR, SFTD, RSRP, RSRQ, RS-SINR, UTRAN FDD CPICH measurements, NR CSI-RSRP, NR CSI-RSRQ, and NR CSI-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NE-DC operation, the effective total number of frequencies excluding the frequencies of the NR PCell, NR SCells, PSCell, and SCells being monitored is $N_{freq,\ NE\text{-}DC}$, which is defined as:

$$N_{freq,\ NE\text{-}DC} = N_{freq,\ NE\text{-}DC,\ NR} + N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA} + N_{freq,\ NE\text{-}DC,\ UTRA},$$

where

$N_{freq,\ NE\text{-}DC,\ NR}$ is the number of NR inter-frequency carriers being monitored as configured by NR PCell.

$N_{freq,\ NE\text{-}DC,\ UTRA}$ is the number of UTRA FDD inter-RAT carriers being monitored as configured by NR PCell,

$N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA} \leq N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA,\ inter\text{-}RAT} + N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA,\ inter\text{-}freq}$

where

$N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA,\ inter\text{-}RAT}$ is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by NR PCell [50] or via LPP [59],

$N_{freq,\ NE\text{-}DC,\ E\text{-}UTRA,\ inter\text{-}freq}$ is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by PSCell.

##### 8.1.2.1.1c.1 NE-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NE-DC operation, the UE shall be capable of monitoring at least per RAT group:

- Depending on UE capability, 7 NR SSB inter-frequency carriers configured by NR PCell [50], and
- Depending on UE capability, 8 NR inter-frequency carriers including SSB and CSI-RS in total configured by NR PCell [50], and
- Depending on UE capability, 6 E-UTRA TDD inter-RAT carriers excluding E-UTRA serving carriers configured by NR PCell [50], and
- Depending on UE capability, 6 E-UTRA FDD inter-RAT carriers excluding E-UTRA serving carriers configured by NR PCell [50], and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [59], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [59].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 6 effective E-UTRA carrier frequency layers, excluding E-UTRA serving carrier(s), comprising of any above defined combination of E-UTRA inter-RAT carriers excluding E-UTRA serving carrier(s) configured by NR PCell and E-UTRA inter-frequency carriers configured by PSCell.

#### 8.1.2.1.2 Network controlled small gap

A UE may reconfigure the receiver bandwidth, carrier frequency or turn on/off one of the RF chains when performing measurements on PCell, activated SCell/PSCell, deactivated SCell and/or unused RF chain. This may cause interruptions on PCell or activated SCell(s) or both that are specified in Section 7.8.

If the UE requires network controlled small gap (NCSG) to prevent the interruption and UE is not configured with asynchrouns DC,

- When UE is not configured with measurement gap, the E-UTRAN can explicitly provide a single NCSG pattern with constant repetition period per UE.
- When UE is configured with Gap Pattern ID #0 on some of, but not all, serving carriers including PCC and SCC(s), a single NCSG pattern with NCSG Pattern ID #0 in Table 8.1.2.1.2-1 can be implicitly configured on the serving carrier(s), where measurement gap is not configured.
- When UE is configured with Gap Pattern ID #1 on some of, but not all, serving carriers including PCC and SCC(s), a single NCSG pattern with NCSG Pattern ID #1 in Table 8.1.2.1.2-1 can be implicitly configured on the serving carrier(s), where measurement gap is not configured.
- When UE measurement gap is configured on all serving carriers including PCC and SCC(s), NCSG should not be configured.

Note: As shown in Figure 8.1.2.1.2-1, subframes of serving carrier 1 from i+1 to i+6 are used as measurement gap. The NCSG can be implicitly configured on other serving carrier subframes from j+1 to j+6, where no measurement gap is configured.

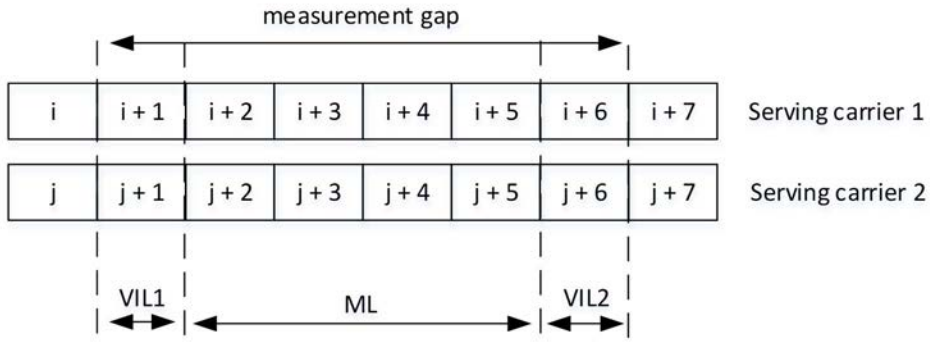


**Figure 8.1.2.1.2-1: Measurement GAP and NCSG**

If the UE requires NCSG to prevent the interruption and the UE supporting asynchronous DC is configured with PSCell which is asynchnous with PCell,

- When there is no measurement gap configured among MCG and SCG cell subframes, the E-UTRAN can explicitly provide a single NCSG pattern with constant repetition period per serving carrier.
- When Gap Pattern ID #0 is configured for UE on MCG (or SCG) and no measurement gap is configured on SCG (or MCG), a single NCSG pattern with NCSG Pattern ID #2 can be implicitly configured on SCG (or MCG).
- When Gap Pattern ID #1 is configured for UE on MCG (or SCG) and no measurement gap is configured on SCG (or MCG), a single NCSG pattern with NCSG Pattern ID #3 can be implicitly configured on SCG (or MCG).

Note: As shown in Figure 8.1.2.1.2-2, one serving carrier subframes from i+1 to i+6 are used as measurement gap. The NCSG can be implicitly configured on other serving carrier subframes from j+1 to j+7, where no measurement gap is configured.

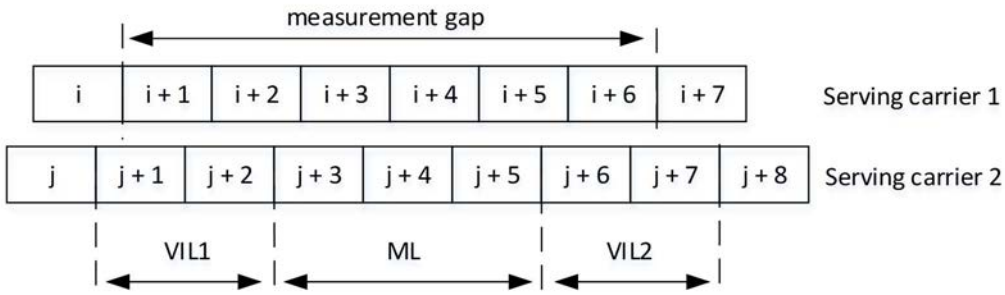


**Figure 8.1.2.1.2-2: Measurement GAP and NCSG for dual connectivity**

UEs shall only support those NCSG patterns listed in Table 8.1.2.1.2-1 that are relevant to its measurement capabilities.

**Table 8.1.2.1.2-1: NCSG Configurations supported by the UE**

| NCSG Pattern Id | Visible interruption length before measurement (VIL1, ms) | Measurement Length during which there is no gap (ML, ms) | Visible interruption length after measurement (VIL2, ms) | Visible interruption Repetition Period (VIRP, ms) | Purpose |
|---|---|---|---|---|---|
| 0 | 1 | 4 | DL: 1<br>UL: 2 | 40 | Interruption control according to requirements in sections 7.8.2.5, 7.8.2.6, 7.8.2.9, 7.8.2.12, 7.10.2.1, 7.10.2.2, 7.10.2.3 |
| 1 | 1 | 4 | DL: 1<br>UL: 2 | 80 | Interruption control according to requirements in sections 7.8.2.5, 7.8.2.6, 7.8.2.9, 7.8.2.12, 7.10.2.1, 7.10.2.2, 7.10.2.3 |
| 2 | 2 | 3 | 2 | 40 | Interruption control according to requirements in sections 7.8.2.5, 7.8.2.6, 7.8.2.9, 7.8.2.12, 7.10.2.1, 7.10.2.2, 7.10.2.3 |
| 3 | 2 | 3 | 2 | 80 | Interruption control according to requirements in sections 7.8.2.5, 7.8.2.6, 7.8.2.9, 7.8.2.12, 7.10.2.1, 7.10.2.2, 7.10.2.3 |

During the VIL1 and VIL2, the UE is not expected to transmit and receive any data. During ML, the UE is expected to transmit and receive data on the corresponding serving carrier(s).

A UE that is capable of identifying and measuring inter-frequency and/or inter-RAT cells without gaps, but needs interruption, and is configured with the network controlled small gap for such measurement (NCSG Pattern Id #0-3) shall follow requirements as if Gap Pattern Id #0 or Gap Pattern Id #1 had been used and shall not make any autonomous interruption outside the visual interruption of the configured network controlled small gap for the measurement, and the minimum available time Tinter1 of 60 ms and 30 ms shall be assumed for the corresponding requirement for visible interruption repetition period (VIRP) of 40 ms and 80 ms, respectively.

## 8.1.2.2 E-UTRAN intra frequency measurements

The UE shall be able to identify new intra-frequency cells and perform RSRP, RSRQ, and RS-SINR measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency cells and additionally search for and identify new intra frequency cells.

### 8.1.2.2.1 E-UTRAN FDD intra frequency measurements

#### 8.1.2.2.1.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within

$$T_{identify\ \ intra} = T_{basic_identify_E\text{-}UTRA_FDD,\ intra} \cdot \frac{T_{Measurement_Period,\ Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_FDD,\ intra}$ is 800 ms

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.5.1 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Section 9.1.17.2.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

$T_{Intra}$ : This is the minimum time that is available for intra frequency measurements, during the measurement period with an arbitrarily chosen timing. Time is assumed to be available for performing intra frequency measurements whenever the receiver is guaranteed to be active on the intra frequency carrier.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated, including nonUniform1 – nonUniform4 gaps, the UE shall be capable of performing measurements for at least $Y_{measurement\ intra}$ cells , where $Y_{measurement\ intra}$ is defined in the following equation. If the UE has identified more than $Y_{measurement\ intra}$ cells, the UE shall perform measurements of at least 8 identified intra- frequency cells but the reporting rate of RSRP, RSRQ, and RS-SINR measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement\ \ intra} = Floor\left\{ X_{basic\ measurement\ FDD} \cdot \frac{T_{Intra}}{T_{Measurement_Period,Intra}} \right\} \text{cells}$$

where

$X_{basic\ measurement\ FDD}$ = 8 (cells),

$T_{Measurement_Period,\ Intra}$ = 200 ms is the measurement period for intra frequency RSRP, RSRQ, and RS-SINR measurements.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.1 and 9.1.2.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.1, and RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.17.2.1.

#### 8.1.2.2.1.1.1 Measurement Reporting Requirements

##### 8.1.2.2.1.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

##### 8.1.2.2.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.2.1.1.1.3.

#### 8.1.2.2.1.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra}$ defined in Clause 8.1.2.2.1.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra}$ defined in clause 8.1.2.2.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.2.1.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.1.2-1. When eDRX_CONN is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.1.2-1A. When *highSpeedEnhancedMeasFlag* is configured the UE shall be able to identify a new detectable FDD intra-frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.1.2-1B. When *highSpeedEnhMeasFlag2-r16* is configured the UE shall be able to identify a new detectable FDD intra-frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.1.2-1C.

**Table 8.1.2.2.1.2-1: Requirement to identify a newly detectable FDD intrafrequency cell**

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (40) |
| 0.128 | 3.2 (25) |
| 0.128<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.1.2-1A: Requirement to identify a newly detectable FDD intra-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note(20) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

**Table 8.1.2.2.1.2-1B: Requirement to identify a newly detectable FDD intrafrequency cell for UE configured with *highSpeedEnhancedMeasFlag***

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(15) |
| 0.08<DRX-cycle≤1.28 | Note2(10) |
| 1.28<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.1.2-1C: Requirement to identify a newly detectable FDD intrafrequency cell for UE configured with *highSpeedEnhMeasFlag2-r16***

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(15) |
| 0.08<DRX-cycle<1.28 | Note2(10) |
| DRX=1.28 | Note2(8) |
| 1.28<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.5.1 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Section 9.1.17.2.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

When DRX is used in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.1.2-2. When eDRX_CONN is used in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.1.2-3. When *highSpeedEnhancedMeasFlag* or *highSpeedEnhMeasFlag2-r16* is configured in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.1.2-4. The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra}$.

**Table 8.1.2.2.1.2-2: Requirement to measure FDD intrafrequency cells**

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.1.2-3: Requirement to measure FDD intra-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

**Table 8.1.2.2.1.2-4: Requirement to measure FDD intrafrequency cells for UE configured with *highSpeedEnhancedMeasFlag* or *highSpeedEnhMeasFlag2-r16***

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (4) |
| 0.08<DRX-cycle≤1.28 | Note2 (3) |
| 1.28<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.1 and 9.1.2.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.1, and RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.17.2.1.

#### 8.1.2.2.1.2.1 Measurement Reporting Requirements

##### 8.1.2.2.1.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

##### 8.1.2.2.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.2.1.2.1.3.

##### 8.1.2.2.1.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra}$ defined in Clause 8.1.2.2.1.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra}$ defined in clause 8.1.2.2.1.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.2.2 E-UTRAN TDD intra frequency measurements

#### 8.1.2.2.2.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within

$$T_{identify\ intra} = T_{basic\ identify\ E-UTRA_TDD,\ intra} \cdot \frac{T_{Measurement\ Period,\ Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_TDD,\ intra}$ is 800 ms

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.5.1 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Section 9.1.17.2.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

$T_{Intra}$ : This is the minimum time that is available for intra frequency measurements, during the measurement period with an arbitrarily chosen timing. Time is assumed to be available for performing intra frequency measurements whenever the receiver is guaranteed to be active on the intra frequency carrier.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement\ intra}$ cells , where $Y_{measurement\ intra}$ is defined in the following equation. If the UE has identified more than $Y_{measurement\ intra}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP, RSRQ, and RS-SINR measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement\ intra} = Floor\left\{ X_{basic\ measurement\ TDD} \cdot \frac{T_{Intra}}{T_{Measurement_Period,\ Intra}} \right\} \text{cells}$$

where

$X_{basic\ measurement\ TDD}$ = 8 (cells),

$T_{Measurement_Period\ Intra}$ = 200 ms is the measurement period for intra frequency RSRP, RSRQ, and RS-SINR measurements.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.1 and 9.1.2.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.1, and RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.17.2.1.

#### 8.1.2.2.2.1.1 Measurement Reporting Requirements

##### 8.1.2.2.2.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

##### 8.1.2.2.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.2.2.1.1.3.

##### 8.1.2.2.2.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra}$ defined in Clause 8.1.2.2.2.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra}$ defined in clause 8.1.2.2.2.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Intra}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.2.2.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.2.2-1. When eDRX_CONN is in use, the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.2.2-1A. When *highSpeedEnhancedMeasFlag* is configured the UE shall be able to identify a new detectable TDD intra-frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.2.2-1B. When *highSpeedEnhMeasFlag2-r16* is configured the UE shall be able to identify a new detectable TDD intra-frequency cell within $T_{identify_intra}$ as shown in table 8.1.2.2.2.2-1C.

**Table 8.1.2.2.2.2-1: Requirement to identify a newly detectable TDD intrafrequency cell**

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (40) |
| 0.128 | 3.2 (25) |
| 0.128<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.2.2-1A: Requirement to identify a newly detectable TDD intra-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note(20) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

**Table 8.1.2.2.2.2-1B: Requirement to identify a newly detectable TDD intrafrequency cell for UE configured with *highSpeedEnhancedMeasFlag***

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(15) |
| 0.08<DRX-cycle≤1.28 | Note2(10) |
| 1.28<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.2.2-1C: Requirement to identify a newly detectable TDD intrafrequency cell for UE configured with *highSpeedEnhMeasFlag2-r16***

| DRX cycle length (s) | $T_{identify_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(15) |
| 0.08<DRX-cycle<1.28 | Note2(10) |
| DRX=1.28 | Note2(8) |
| 1.28<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.2.1 and 9.1.2.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.5.1 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Clause 9.1.17.2.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

When DRX is in use in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.2.2-2. When eDRX_CONN is in use in the RRC_CONNECTED state, the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.2.2-3. When *highSpeedEnhancedMeasFlag* or *highSpeedEnhMeasFlag2-r16* is configured in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.1.2.2.2.2-4. The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified intra-frequency cells and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra}$.

**Table 8.1.2.2.2.2-2: Requirement to measure TDD intra frequency cells**

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |

| | |
|---|---|
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

**Table 8.1.2.2.2.2-3: Requirement to measure TDD intra-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use. | |

**Table 8.1.2.2.2.2-4: Requirement to measure TDD intrafrequency cells for UE configured with *highSpeedEnhancedMeasFlag* or *highSpeedEnhMeasFlag2-r16***

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (4) |
| 0.08<DRX-cycle≤1.28 | Note2 (3) |
| 1.28<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.1 and 9.1.2.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.1, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.17.2.1.

#### 8.1.2.2.2.2.1 Measurement Reporting Requirements

##### 8.1.2.2.2.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

##### 8.1.2.2.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.2.2.2.1.3.

##### 8.1.2.2.2.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.1, 9.1.2.2, 9.1.5.1, and 9.1.17.2.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra}$ defined in Clause 8.1.2.2.2.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra}$ defined in clause 8.1.2.2.2.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.2.3 E-UTRAN FDD intra frequency measurements with autonomous gaps

#### 8.1.2.2.3.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,intra} = T_{basic_identify_CGI,intra} \quad ms$$

Where

$T_{basic_identify_CGI,\ intra}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,.intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall transmit at least 60 ACK/NACKs on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

Note : ACK requirements for CGI reading were derived assuming *ShortTTI-r15* is not configured. When *ShortTTI-r15* is configured is used, a greater number of transmitted ACK/NACK is expected.

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :

- the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and
- DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.

- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit the required number of ACK/NACKs on PCell or each of the activated SCell(s).

#### 8.1.2.2.3.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.2.4 E-UTRAN TDD intra frequency measurements with autonomous gaps

#### 8.1.2.2.4.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1 messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,intra} = T_{basic_identify_CGI,intra} \quad ms$$

Where

$T_{basic_identify_CGI,\ intra}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable when the following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,\ intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall be able to transmit at least the number of ACK/NACKs stated in Table 8.1.2.2.4.1-1 on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

**Table 8.1.2.2.4.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{basic_identify_CGI,\ intra}$.**

| UL/DL configuration | Minimum number of transmitted ACK/NACKs |
|---|---|
| 0 (Note 1) | 18 |

| | |
|---|---|
| 1 | 35 |
| 2 | 43 |
| 3 | 36 |
| 4 | 39 |
| 5 | 42 |
| 6 | 30 |
| Note 1: When a UE is configured with EIMTA-*MainConfigServCell* via RRC signalling [2] only this requirement shall apply. | |

Note : ACK requirements for CGI reading were derived assuming *ShortTTI-r15* is not configured. When *ShortTTI-r15* is configured is used, a greater number of transmitted ACK/NACK is expected.

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :
  - the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and
  - DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.
- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit at least the number of ACK/NACKs as specified in Table 8.1.2.2.4.1-1 on PCell or each of the activated SCell(s).

#### 8.1.2.2.4.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.2.5 E-UTRAN FDD intra-frequency measurements on carrier with FeMBMS/Unicast mixed cells

Requirements in this section apply for UE configured to perform intra-frequency measurements on a carrier with one or more FeMBMS/Unicast mixed cells and which are capable of unicast reception from FeMBMS/Unicast mixed cell and capable of receiving at least one of *SystemInformationBlockType15* or *fembms-MixedCarrier-r14* indication and are provided with the information that one or more FeMBMS/Unicast mixed cells are present on the intra-frequency to be measured.

The UE shall meet the requirements in Section 8.1.2.2.1, when performing intra-frequency measurements on a carrier with at least one FeMBMS/Unicast mixed cell. The minimum number of cells that the UE shall be able to measure on includes also FeMBMS/Unicast mixed cells.

## 8.1.2.3 E-UTRAN inter frequency measurements

The UE shall be able to identify new inter-frequency cells and perform RSRP, RSRQ, and RS-SINR measurements of identified inter-frequency cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

The requirements in this section shall also appy, when the UE is configured to perform SRS carrier based switching and using measurement gaps.

### 8.1.2.3.1 E-UTRAN FDD – FDD inter frequency measurements

#### 8.1.2.3.1.1 E-UTRAN FDD – FDD inter frequency measurements when no DRX is used

When measurement gaps other than nonUniform1 – nonUniform4 are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n} \cdot K_n \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r} \cdot K_r \quad ms \text{ (reduced performance)}$$

Where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD inter-frequency cell is defined.

$N_{freq,n}$ $N_{freq,r}$ $K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1

When measurement gaps nonUniform1 – nonUniform4 are scheduled, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expressions:

$$T_{Identify_Inter} = 8 \cdot T_{burst} \cdot N_{freq} \quad ms$$

If the UE requires measurement gaps to identify and measure inter-frequency and/or inter-RAT cells and the UE supports perServingCellMeasurementGap-r14 and is configured with per per-CC, or the UE supports parallel measurements, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter_perCC}$ according to the following expression:

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n,effective} \cdot K_n \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r,effective} \cdot K_r \quad ms \text{ (reduced performance)}$$

where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD inter-frequency cell is defined.

If the UE supports perServingCellMeasurementGap-r14 and is configured with per-CC gap, or the UE supports parallel measurements, Nfreq,n = Nfreq,n,effective shall be used in section 8.1.2.3.1 when deriving the UE requirements. $N_{freq,n,effective}$ $N_{freq,r,effective}$ are defined as effective number of layers to be monitored by the UE for normal performance group and reduced performance group. They are reported by the UE. $N_{freq,n,effective}$ should be equal or less than $N_{freq,n}$ defined in clause 8.1.2.1.1. and $N_{freq,r,effective}$ should be equal or less than $N_{freq,r}$ defined in clause 8.1.2.1.1$K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1For UE other than category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,

- SCH_RP|$_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively, with measurement period given by table 8.1.2.3.1.1-1.

**Table 8.1.2.3.1.1-1:** M**easurement period and measurement bandwidth**

| Configuration | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (normal performance) | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (reduced performance) | Measurement bandwidth [RB] |
|---|---|---|---|
| 0 | 480 x $K_n$ x $N_{freq,n}$ | 480 x $K_r$ x $N_{freq,r}$ | 6 |
| 1 (Note 1) | 240 x $K_n$ x $N_{freq,n}$ | 240 x $K_r$ x $N_{freq,r}$ | 50 |
| 2 (Note 2) | $T_{burst}$ x $N_{freq}$ | N/A | 6 |
| 3 (Note 3) | ½·$T_{burst}$ x $N_{freq}$ | N/A | 50 |
| Note 1: This configuration is optional<br>Note 2: This configuration is for when nonUniform1 – nonUniform4 are configured<br>Note 3: This configuration is optional and when nonUniform1 – nonUniform4 are configured | | | |

The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies or 8 FDD interfrequencies if the UE supports Increased UE carrier monitoring E-UTRA and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period defined in Table 8.1.2.3.1.1-1.

For category 1bis UE, when measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.3, 9.1.3.4, 9.1.6.5 and 9.1.6.6, respectively, with measurement period given by table 8.1.2.3.1.1-2.

**Table 8.1.2.3.1.1-2:** M**easurement period and measurement bandwidth (category 1bis UE)**

| Configuration | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (normal performance) | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (reduced performance) | Measurement bandwidth [RB] |
|---|---|---|---|
| 0 | 960 x $K_n$ x $N_{freq,n}$ | 960 x $K_r$ x $N_{freq,r}$ | 6 |
| 1 (Note) | 480 x $K_n$ x $N_{freq,n}$ | 480 x $K_r$ x $N_{freq,r}$ | 50 |
| Note: This configuration is optional | | | |

The category 1bis UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies or 8 FDD interfrequencies if the UE supports Increased UE carrier monitoring E-UTRA and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in Table 8.1.2.3.1.1-2.

8.1.2.3.1.1.1 Measurement Reporting Requirements

8.1.2.3.1.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

8.1.2.3.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.1.1.1.3.

8.1.2.3.1.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH . The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\text{-}inter}$ or $T_{identify\text{-}inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.1.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter}$ or $T_{identify\text{-}inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.1.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_Inter_FDD}$ defined in clause 8.1.2.3.1.1 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.3.1.2 E-UTRAN FDD – FDD inter frequency measurements when DRX is used

When DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN FDD inter frequency cell within $T_{identify_inter}$ or $T_{identify\text{-}inter\text{-}perCC}$ when per-CC based measurement gap configured. When DRX is in use, $T_{identify_inter}$ is as defined in Table 8.1.2.3.1.2-1, and when eDRX_CONN is in use, $T_{identify_inter}$ is as defined in Table 8.1.2.3.1.2-1A for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.1.2-1B.

**Table 8.1.2.3.1.2-1: Requirement to identify a newly detectable FDD interfrequency cell**

| DRX cycle length (s) | $T_{identify_inter}$ (s) (DRX cycles), normal performance | | $T_{identify_inter}$ (s) (DRX cycles), reduced performance | |
|---|---|---|---|---|
| | Gap period = 40 ms, 20ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable |
| 0.256 | $5.12*K_n*N_{freq,n}$ ($20*K_n*N_{freq,n}$) | $7.68*K_n*N_{freq,n}$ ($30*K_n*N_{freq,n}$) | $5.12*K_r*N_{freq,r}$ ($20*K_r*N_{freq,r}$) | $7.68*K_r*N_{freq,r}$ ($30*K_r*N_{freq,r}$) |
| 0.32 | $6.4*K_n*N_{freq,n}$ ($20*K_n*N_{freq,n}$) | $7.68*K_n*N_{freq,nl}$ ($24*K_n*N_{freq,n}$) | $6.4*K_r*N_{freq,r}$ ($20*K_r*N_{freq,r}$) | $7.68*K_r*N_{freq,r}$ ($24*K_r*N_{freq,r}$) |
| 0.32< DRX-cycle≤2.56 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.3.1.2-1A: Requirement to identify a newly detectable FDD inter-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter}$ (s) (eDRX_CONN cycles), normal performance | | $T_{identify_inter}$ (s) (eDRX_CONN cycles), reduced performance | |
|---|---|---|---|---|
| | Gap period = 40 ms, 20ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56< eDRX_CONN cycle≤10.24 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

**Table 8.1.2.3.1.2-1B: Requirement to identify a newly detectable FDD inter-frequency cell when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{identify_inter}$ (DRX_cycles) | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable |
| 0.16< DRX-cycle<2.56 | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) |
| Note: Time depends upon the DRX cycle in use | | | | |

For UE other than category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.1.2.3.1.2-2, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.1.2-3 for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.1.2-4.

**Table 8.1.2.3.1.2-2: Requirement to measure FDD interfrequency cells**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal performance) | $T_{measure_inter}$ (s) (DRX cycles) (reduced performance) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable |
| 0.08<DRX-cycle≤2.56 | Note (5*$K_n$*$N_{freq,n}$) | Note (5*$K_r$*$N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.1.2-3: Requirement to measure FDD inter-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal performance) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced performance) |
|---|---|---|

| | | |
|---|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

**Table 8.1.2.3.1.2-4: Requirement to measure FDD inter-frequency cells when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{measure_inter}$ (DRX cycles) | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| DRX-cycle ≤2.56 | Note (5* $N_{freq}$ *ceil($T_{burst}$/480)) | Note (5* $N_{freq}$ *ceil($T_{burst}$/480)) | Note (5* $N_{freq}$ *ceil($T_{burst}$/480)) | Note (5* $N_{freq}$ *ceil($T_{burst}$/480)) |
| Note: Time depends on the DRX cycles in use | | | | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.1 and 9.1.3.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.1 and 9.1.6.2, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.17.3.1 and 9.1.17.3.2.

For category 1bis UE, when DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.1.2.3.1.2-5, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.1.2-6.

**Table 8.1.2.3.1.2-5: Requirement to measure FDD interfrequency cells (category 1bis UE)**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal performance) | $T_{measure_inter}$ (s) (DRX cycles) (reduced performance) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable |
| 0.08<DRX-cycle≤2.56 | Note ($10*K_n*N_{freq,n}$) | Note ($10*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.1.2-6: Requirement to measure FDD inter-frequency cells when eDRX_CONN cycle is used (category 1bis UE)**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal performance) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced performance) |
|---|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($10*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.3 and 9.1.3.4 and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.5 and 9.1.6.6.

8.1.2.3.1.2.1 Measurement Reporting Requirements

8.1.2.3.1.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

8.1.2.3.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.1.2.1.3.

#### 8.1.2.3.1.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter}$ defined in clause 8.1.2.3.1.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter}$ defined in clause 8.1.2.3.1.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measure_inter}$ defined in clause 8.1.2.3.1.2 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.3.2 E-UTRAN TDD – TDD inter frequency measurements

#### 8.1.2.3.2.1 E-UTRAN TDD – TDD inter frequency measurements when no DRX is used

When measurement gaps other than nonUniform1 – nonUniform4 are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new TDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

- When configuration 0 or configuration 1 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq} \quad ms,$$

- When configuration 2 or configuration 3 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq} + 240 \cdot N_{freq} \quad ms,.$$

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new TDD inter-frequency cell is defined.

$N_{freq}$ is defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1

When measurement gaps nonUniform1 – nonUniform4 are scheduled, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

- When configuration 0 or configuration 1 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter} = 8 \cdot T_{burst} \cdot N_{freq} \quad ms$$

- When configuration 2 or configuration 3 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter} = 8 \cdot T_{burst} \cdot N_{freq} + \frac{1}{2} T_{burst} \cdot N_{freq} \quad ms$$

If the UE requires measurement gaps to identify and measure inter-frequency and/or inter-RAT cells and the UE supports perServingCellMeasurementGap-r14 and is configured per-CC, or the UE supports parallel measurements, the UE shall be able to identify a new TDD inter-frequency within $T_{Identify_Inter_perCC}$ according to the following expression:

- When configuration 0 or configuration 1 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n,effective} \cdot K_n \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r,effective} \cdot K_r \quad ms \text{ (reduced performance)}$$

- When configuration 2 or configuration 3 in Table 8.1.2.3.2.1-1 is applied,

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n,effective} \cdot K_n + 240 \cdot N_{freq} \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r,effective} \cdot K_r + 240 \cdot N_{freq} \quad ms \text{ (reduced performance)}$$

where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new TDD inter-frequency cell is defined.

If the UE supports perServingCellMeasurementGap-r14 and is configured with per-CC gap, or the UE supports parallel measurements, Nfreq,n = Nfreq,n,effective shall be used in section 8.1.2.3.2 when deriving the UE requirements. $N_{freq,n,effective}$ $N_{freq,r,effective}$ are defined as effective number of layers to be monitored by the UE for normal performance group and reduced performance group. They are reported by the UE. $N_{freq,n,effective}$ should be equal or less than $N_{freq,n}$ defined in clause 8.1.2.1.1. and $N_{freq,r,effective}$ should be equal or less than $N_{freq,r}$ defined in clause 8.1.2.1.1. $K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1.

For UE other than category 1bis UE , a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.1, 9.1.3.2,

9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively, with measurement period ($T_{Measurement_Period_TDD_Inter}$) given by table 8.1.2.3.2.1-1:

**Table 8.1.2.3.2.1-1: $T_{Measurement_Period_TDD_Inter}$ for different configurations**

| Configuration | Measurement bandwidth [RB] | Number of UL/DL sub-frames per half frame (5 ms) | | DwPTS | | $T_{Measurement_Period_TDD_Inter}$ [ms] (normal performance) | $T_{Measurement_Period_TDD_Inter}$ [ms] (reduced performance) |
|---|---|---|---|---|---|---|---|
| | | DL | UL | Normal CP | Extended CP | | |
| 0 | 6 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 480 x $K_n$ x $N_{freq,n}$ | 480 x $K_r$ x $N_{freq,r}$ |
| 1 (Note 1) | 50 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 240 x $K_n$ x $N_{freq,n}$ | 240 x $K_r$ x $N_{freq,r}$ |
| 2 | 6 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 720 x $K_n$ x $N_{freq,n}$ | 720 x $K_r$ x $N_{freq,r}$ |
| 3 (Note 1) | 50 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 480 x $K_n$ x $N_{freq,n}$ | 480 x $K_r$ x $N_{freq,r}$ |
| 4 | 6 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | $T_{burst}$ x $N_{freq}$ | $T_{burst}$ x $N_{freq}$ |
| 5 (Note 3) | 50 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | ½ x $T_{burst}$ x $N_{freq}$ | ½ x $T_{burst}$ x $N_{freq}$ |
| 6 | 6 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 3/2·$T_{burst}$ x $N_{freq}$ | 3/2 x $T_{burst}$ x $N_{freq}$ |
| 7 (Note 3) | 50 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | $T_{burst}$ x $N_{freq}$ | $T_{burst}$ x $N_{freq}$ |
| Note 1: This configuration is optional<br>Note 2: $T_s$ is defined in TS 36.211 [16]<br>Note 3: This configuration is optional and when nonUniform1 – nonUniform4 are configured | | | | | | | |

The UE shall be capable of performing RSRP, RSRQ, RS-SINR measurements of at least 4 inter-frequency cells per TDD inter-frequency and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{Measurement_Period_TDD_Inter}$.

For category 1bis UE, when measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.3, 9.1.3.4, 9.1.6.5 and 9.1.6.6, respectively, with measurement period ($T_{Measurement_Period_TDD_Inter}$) given by table 8.1.2.3.2.1-2:

**Table 8.1.2.3.2.1-2: $T_{Measurement_Period_TDD_Inter}$ for different configurations (category 1bis UE)**

| Configuration | Measurement bandwidth [RB] | Number of UL/DL sub-frames per half frame (5 ms) | | DwPTS | | $T_{Measurement_Period_TDD_Inter}$ [ms] (normal performance) | $T_{Measurement_Period_TDD_Inter}$ [ms] (reduced performance) |
|---|---|---|---|---|---|---|---|
| | | DL | UL | Normal CP | Extended CP | | |
| 0 | 6 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 960 x $K_n$ x $N_{freq,n}$ | 960 x $K_r$ x $N_{freq,r}$ |
| 1 (Note 1) | 50 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 480 x $K_n$ x $N_{freq,n}$ | 480 x $K_r$ x $N_{freq,r}$ |
| 2 | 6 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 1440 x $K_n$ x $N_{freq,n}$ | 1440 x $K_r$ x $N_{freq,r}$ |
| 3 (Note 1) | 50 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 960 x $K_n$ x $N_{freq,n}$ | 960 x $K_r$ x $N_{freq,r}$ |
| Note 1: This configuration is optional<br>Note 2: $T_s$ is defined in TS 36.211 [16] | | | | | | | |

The category 1bis UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{Measurement_Period_TDD_Inter}$ given by table 8.1.2.3.2.1-2.

#### 8.1.2.3.2.1.1 Measurement Reporting Requirements

##### 8.1.2.3.2.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

##### 8.1.2.3.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.2.1.1.3.

##### 8.1.2.3.2.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify_Inter}$ or $T_{identify\ –inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.2.1. When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify_Inter}$ or $T_{identify\ –inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.2.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_TDD_Inter}$ defined in clause 8.1.2.3.2.1 provided the timing to that cell has not changed more than ± 50 Ts while measurementgap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.3.2.2 E-UTRAN TDD – TDD inter frequency measurements when DRX is used

When DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN TDD inter frequency cell within $T_{identify_inter}$ or $T_{identify\ –inter\text{-}perCC}$ when per-CC based measurement gap configured. When DRX is in use, $T_{identify_inter}$ is as defined in Table 8.1.2.3.2.2-1, and when eDRX_CONN is in use $T_{identify_inter}$ is as defined in Table 8.1.2.3.2.2-1A for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.2.2-1B.

**Table 8.1.2.3.2.2-1: Requirement to identify a newly detectable TDD interfrequency cell**

| DRX cycle length (s) | $T_{identify_inter}$ (s) (DRX cycles) (normal performance) | | $T_{identify_inter}$ (s) (DRX cycles) (reduced performance) | |
|---|---|---|---|---|
| | Gap period = 40 ms, 20ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable |
| 0.256 | $5.12*K_n*N_{freq,n}$ ($20*K_n*N_{freq,n}$) | $7.68*K_n*N_{freq,n}$ ($30*K_n*N_{freq,n}$) | $5.12*K_r*N_{freq,r}$ ($20*K_r*N_{freq,r}$) | $7.68*K_r*N_{freq,r}$ ($30*K_r*N_{freq,r}$) |

| | | | | |
|---|---|---|---|---|
| 0.32 | 6.4*$K_n$ *$N_{freq,n}$ (20*$K_n$ *$N_{freq,n}$) | 7.68*$K_n$ *$N_{freq,n}$ (24*$K_n$ *$N_{freq,n}$) | 6.4*$K_r$ *$N_{freq,r}$ (20*$K_r$ *$N_{freq,r}$) | 7.68*$K_r$ *$N_{freq,r}$ (24*$K_r$ *$N_{freq,r}$) |
| 0.32<DRX-cycle≤2.56 | Note (20*$K_n$ *$N_{freq,n}$) | Note (20*$K_n$ *$N_{freq,n}$) | Note (20*$K_r$ *$N_{freq,r}$) | Note (20*$K_r$ *$N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.3.2.2-1A: Requirement to identify a newly detectable TDD inter-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter}$ (s) (eDRX_CONN cycles) (normal performance) | | $T_{identify_inter}$ (s) (eDRX_CONN cycles) (reduced performance) | |
|---|---|---|---|---|
| | Gap period = 40 ms, 20ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle ≤10.24 | Note (20*$K_n$ *$N_{freq,n}$) | Note (20*$K_n$ *$N_{freq,n}$) | Note (20*$K_r$ *$N_{freq,r}$) | Note (20*$K_r$ *$N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

**Table 8.1.2.3.2.2-1B: Requirement to identify a newly detectable TDD inter-frequency cell when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{identify_inter}$ (DRX cycles) | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable | Non DRX Requirements in clause 8.1.2.3.1.1 are applicable |
| 0.16< DRX-cycle<2.56 | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) | Note (20* $N_{freq}$ *ceil($T_{burst}$/480) ) |
| Note: Time depends upon the DRX cycle in use | | | | |

For UE other than category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.2.2-2, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.2.2-3 for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.2.2-4.

**Table 8.1.2.3.2.2-2: Requirement to measure TDD interfrequency cells**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal requirement) | $T_{measure_inter}$ (s) (DRX cycles) (reduced requirement) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable |
| 0.128 | When configuration 2 non DRX Requirements in clause 8.1.2.3.2.1 are applicable, Otherwise Note ($5*K_n*N_{freq,n}$) | When configuration 2 non DRX Requirements in clause 8.1.2.3.2.1 are applicable, Otherwise Note ($5*K_r*N_{freq,r}$) |
| 0.128<DRX-cycle≤2.56 | Note ($5*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.2.2-3: Requirement to measure TDD inter-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal requirement) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced requirement) |
|---|---|---|
| 2.56<eDRX_CONN cycle ≤10.24 | Note ($5*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

**Table 8.1.2.3.2.2-4: Requirement to measure TDD inter-frequency cells when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{measure_inter}$ (DRX cycles) | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| DRX-cycle ≤2.56 | Note ($5* N_{freq}$ *ceil($T_{burst}$/480)) | Note ($5* N_{freq}$ *ceil($T_{burst}$/480)) | Note ($5* N_{freq}$ *ceil($T_{burst}$/480)) | Note ($5* N_{freq}$ *ceil($T_{burst}$/480)) |
| Note: Time depends upon the DRX cycle in use | | | | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.1 and 9.1.3.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.1 and 9.1.6.2, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.17.3.1 and 9.1.17.3.2.

For category 1bis UE, when DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.2.2-5, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.2.2-6.

**Table 8.1.2.3.2.2-5: Requirement to measure TDD interfrequency cells (category 1bis UE)**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal requirement) | $T_{measure_inter}$ (s) (DRX cycles) (reduced requirement) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable | Non DRX Requirements in clause 8.1.2.3.2.1 are applicable |

| | | |
|---|---|---|
| 0.128 | When configuration 2 non DRX Requirements in clause 8.1.2.3.2.1 are applicable, Otherwise Note ($10*K_n*N_{freq,n}$) | When configuration 2 non DRX Requirements in clause 8.1.2.3.2.1 are applicable, Otherwise Note ($10*K_r*N_{freq,r}$) |
| 0.128<DRX-cycle≤2.56 | Note ($10*K_n*N_{freq,n}$) | Note ($10*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.2.2-6: Requirement to measure TDD inter-frequency cells when eDRX_CONN cycle is used (category 1bis UE)**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal requirement) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced requirement) |
|---|---|---|
| 2.56<eDRX_CONN cycle ≤10.24 | Note ($10*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.3 and 9.1.3.4 and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.5 and 9.1.6.6.

#### 8.1.2.3.2.2.1 Measurement Reporting Requirements

##### 8.1.2.3.2.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

##### 8.1.2.3.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.2.2.1.3.

##### 8.1.2.3.2.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clause 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify_Inter}$ defined in Clause 8.1.2.3.2.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify_Inter}$ in clause 8.1.2.3.2.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measure_inter}$ in clause 8.1.2.3.2.2 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or

the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.3.3 E-UTRAN TDD – FDD inter frequency measurements

##### 8.1.2.3.3.1 E-UTRAN TDD – FDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.1.2.3.1.1 also apply for this section.

##### 8.1.2.3.3.2 E-UTRAN TDD – FDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

When DRX or eDRX_CONN cycle is used, the requirements in clause 8.1.2.3.1.2 shall also apply for this section.

#### 8.1.2.3.4 E-UTRAN FDD – TDD inter frequency measurements

##### 8.1.2.3.4.1 E-UTRAN FDD – TDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.1.2.3.2.1 also apply for this section.

##### 8.1.2.3.4.2 E-UTRAN FDD – TDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

When DRX or eDRX_CONN cycle is used, the requirements in clause 8.1.2.3.2.2 shall also apply for this section.

#### 8.1.2.3.5 E-UTRAN FDD-FDD inter frequency measurements with autonomous gaps

##### 8.1.2.3.5.1 Identification of a new CGI of E-UTRA FDD cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose of 'reportCGI'. The UE may make autonomous gaps in both downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,inter} = T_{basic_identify_CGI,inter} \quad ms$$

Where

$T_{basic_identify_CGI,\ inter}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,inter}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI,intra}\ ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall transmit at least 60 ACK/NACKs on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,

- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

Note : ACK requirements for CGI reading were derived assuming *ShortTTI-r15* is not configured. When *ShortTTI-r15* is configured is used, a greater number of transmitted ACK/NACK is expected.

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :
  - the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and
  - DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.
- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit the required number of ACK/NACKs on PCell or each of the activated SCell(s).

#### 8.1.2.3.5.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.3.6 E-UTRAN TDD-FDD inter frequency measurements using autonomous gaps

The requirements in this clause shall apply to UE supporting FDD and TDD.

#### 8.1.2.3.6.1 Identification of a new CGI of E-UTRA FDD cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose of 'reportCGI'. The UE may make autonomous gaps in both downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,inter} = T_{basic_identify_CGI,inter} \quad ms$$

Where

$T_{basic_identify_CGI,\ inter}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.4 for a corresponding Band.

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,inter}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_GI,inter}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall be able to transmit at least the number of ACK/NACKs stated in Table 8.1.2.3.6.1-1 on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

**Table 8.1.2.3.6.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{basic_identify_CGI,\ inter}$.**

| TDD UL/DL configuration for serving cell | Minimum number of transmitted ACK/NACKs |
|---|---|
| 0 (Note 1) | 18 |
| 1 | 30 |
| Note 1: When a UE is configured with *EIMTA-MainConfigServCell* via RRC signalling [2] only this requirement shall apply.<br>Note 2: The requirement for other TDD UL/DL configuration is not specified. | |

Note : ACK requirements for CGI reading were derived assuming 1ms TTI duration for both UL and DL. When shorter TTI is used, a greater number of transmitted ACK/NACK is expected.

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :
  - the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and
  - DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.
- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit at least the number of ACK/NACKs as specified in Table 8.1.2.3.6.1-1 on PCell or each of the activated SCell(s).

#### 8.1.2.3.6.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.3.7 E-UTRAN TDD-TDD inter frequency measurements with autonomous gaps

#### 8.1.2.3.7.1 Identification of a new CGI of E-UTRA TDD cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose of 'reportCGI'. The UE may make autonomous gaps in both downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,inter} = T_{basic_identify_CGI,inter} \quad ms$$

Where

$T_{basic_identify_CGI, inter}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.4 for a corresponding Band.

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,inter}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI,inter}$ *ms*, over which the UE identifies the new CGI of E-UTRA cell, the UE shall be able to transmit at least the number of ACK/NACKs stated in Table 8.1.2.3.7.1-1 on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

**Table 8.1.2.3.7.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{basic_identify_CGI, inter}$.**

| TDD UL/DL configuration for serving cell | Minimum number of transmitted ACK/NACKs |
|---|---|
| 0 (Note 1) | 18 |
| 1 | 30 |
| Note 1: When a UE is configured with *EIMTA-MainConfigServCell* via RRC signalling [2] only this requirement shall apply cell.<br>Note 2: The requirement for other TDD UL/DL configuration is not specified. | |

Note : ACK requirements for CGI reading were derived assuming 1ms TTI duration for both UL and DL. When shorter TTI is used, a greater number of transmitted ACK/NACK is expected.

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :
  - the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and
  - DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.
- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit at least the number of ACK/NACKs as specified in Table 8.1.2.3.7.1-1 on PCell or each of the activated SCell(s).

#### 8.1.2.3.7.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.3.8 E-UTRAN FDD-TDD inter frequency measurements using autonomous gaps

The requirements in this clause shall apply to UE supporting FDD and TDD.

#### 8.1.2.3.8.1 Identification of a new CGI of E-UTRA TDD cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose of 'reportCGI'. The UE may make autonomous gaps in both downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,inter} = T_{basic_identify_CGI,inter} \quad ms$$

Where

$T_{basic_identify_CGI,\ inter}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.4 for a corresponding Band.

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,inter}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI,inter}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall have more than 60 ACK/NACKs transmitted on PCell or each of activated SCell(s), provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

Note : ACK requirements for CGI reading were derived assuming 1ms TTI duration for both UL and DL. When shorter TTI is used, a greater number of transmitted ACK/NACK is expected

For the UE capable of SRS carrier based switching when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission via one or more SCells without PUSCH (NOTE: The requirement on the number of ACK/NACKs transmitted during SRS carrier based switching does not need to be tested):

- the requirements defined in this section shall be met provided during :

- the SRS carrier based switching does not cause any interruption on the PCell or on any activated SCell during and

- DL subframe #0 and DL subframe #5 per radio frame of the target E-UTRA are available at the UE.

- otherwise the time to acquire the new CGI of the E-UTRA cell may be extended or the UE may not be able to transmit the required number of ACK/NACKs on PCell or each of the activated SCell(s).

#### 8.1.2.3.8.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.3.9 E-UTRAN FDD – FDD inter frequency measurements with FeMBMS/Unicast mixed cells

Requirements in this section apply for UE configured to perform inter-frequency measurements on a carrier with one or more FeMBMS/Unicast mixed cells and which are capable of receiving unicast from the FeMBMS/Unicast mixed cell and are capable of receiving at least one of *SystemInformationBlockType15* or *fembms-MixedCarrier-r14* indication and are provided with the information that one or more FeMBMS/Unicast mixed cells are present on the inter-frequency to be measured.

The minimum number of cells and the minimum number of inter-frequencies that the UE shall be able to measure on include also FeMBMS/Unicast mixed cells and the inter-frequencies with and without such cells.

#### 8.1.2.3.9.1 E-UTRAN FDD – FDD inter frequency measurements with FeMBMS/unicast mixed cells when no DRX is used

When measurement gaps other than nonUniform1 – nonUniform4 are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n} \cdot K_n + 240 \cdot N_{freq,n} \cdot K_n \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r} \cdot K_r + 240 \cdot N_{freq,r} \cdot K_r \quad ms \text{ (reduced performance)}$$

Where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD inter-frequency cell is defined.

$N_{freq,n}$ $N_{freq,r}$ $K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1

When measurement gaps nonUniform1 – nonUniform4 are scheduled, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expressions:

$$T_{Identify_Inter} = 8 \cdot T_{burst} \cdot N_{freq} + \frac{1}{2} T_{burst} \cdot N_{freq} \quad ms$$

If the UE requires measurement gaps to identify and measure inter-frequency and/or inter-RAT cells and the UE supports perServingCellMeasurementGap-r14 and is configured with per per-CC, or the UE supports parallel measurements, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter_perCC}$ according to the following expression:

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n,effective} \cdot K_n + 240 \cdot N_{freq,n} \quad ms$$ (normal performance) and

$$T_{Identify_Inter_perCC} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r,effective} \cdot K_r + 240 \cdot N_{freq,r} \quad ms$$ (reduced performance)

where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD inter-frequency cell is defined.

If the UE supports perServingCellMeasurementGap-r14 and is configured with per-CC gap, or the UE supports parallel measurements, Nfreq,n = Nfreq,n,effective shall be used in section 8.1.2.3.9 when deriving the UE requirements. $N_{freq,n,effective}$ $N_{freq,r,effective}$ are defined as effective number of layers to be monitored by the UE for normal performance group and reduced performance group. They are reported by the UE. $N_{freq,n,effective}$ should be equal or less than $N_{freq,n}$ defined in clause 8.1.2.1.1. and $N_{freq,r,effective}$ should be equal or less than $N_{freq,r}$ defined in clause 8.1.2.1.1$K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1. For UE other than category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively, with measurement period given by table 8.1.2.3.9.1-1.

**Table 8.1.2.3.9.1-1:** M**easurement period and measurement bandwidth**

| Configuration | Physical Layer Measurement period: TMeasurement_Period _Inter_FDD [ms] (normal performance) | Physical Layer Measurement period: TMeasurement_Period _Inter_FDD [ms] (reduced performance) | Measurement bandwidth [RB] |
|---|---|---|---|
| 0 | 720 x Kn x Nfreq,n | 720 x Kr x Nfreq,r | 6 |
| 1 (Note 1) | 480 x Kn x Nfreq,n | 480 x Kr x Nfreq,r | 50 |
| 2 (Note 2) | $1.5 \cdot T_{burst}$ x $N_{freq}$ | $1.5 \cdot T_{burst}$ x $N_{freq}$ | 6 |
| 3 (Note 3) | $T_{burst}$ x $N_{freq}$ | $T_{burst}$ x $N_{freq}$ | 50 |
| Note 1: This configuration is optional<br>Note 2: This configuration is for when nonUniform1 – nonUniform4 are configured<br>Note 3: This configuration is optional and when nonUniform1 – nonUniform4 are configured | | | |

The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies or 8 FDD interfrequencies if the UE supports Increased UE carrier monitoring E-UTRA and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period defined in Table 8.1.2.3.9.1-1.

For category 1bis UE, when measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.3, 9.1.3.4, 9.1.6.5 and 9.1.6.6, respectively, with measurement period given by table 8.1.2.3.9.1-2.

**Table 8.1.2.3.9.1-2:** M**easurement period and measurement bandwidth (category 1bis UE)**

| Configuration | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (normal performance) | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] (reduced performance) | Measurement bandwidth [RB] |
|---|---|---|---|
| 0 | $1440 \times K_n \times N_{freq,n}$ | $1440 \times K_r \times N_{freq,r}$ | 6 |
| 1 (Note) | $960 \times K_n \times N_{freq,n}$ | $960 \times K_r \times N_{freq,r}$ | 50 |
| Note: This configuration is optional | | | |

The category 1bis UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies or 8 FDD interfrequencies if the UE supports Increased UE carrier monitoring E-UTRA and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in Table 8.1.2.3.9.1-2.

#### 8.1.2.3.9.1.1 Measurement Reporting Requirements

##### 8.1.2.3.9.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

##### 8.1.2.3.9.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.9.1.1.3.

##### 8.1.2.3.9.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH . The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\text{-}inter}$ or $T_{identify\text{–}inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.9.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter}$ or $T_{identify\text{–}inter\text{-}perCC}$ when per-CC based measurement gap configured defined in clause 8.1.2.3.9.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_Inter_FDD}$ defined in clause 8.1.2.3.9.1 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.3.9.2 E-UTRAN FDD – FDD inter frequency measurements with FeMBMS/Unicast mixed cells when DRX is used

When DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN FDD inter frequency cell within $T_{identify_inter}$ or $T_{identify\ –inter\text{-}perCC}$ when per-CC based measurement gap configured. When DRX is in use, $T_{identify_inter}$ is as defined in Table 8.1.2.3.9.2-1, and when eDRX_CONN is in use, $T_{identify_inter}$ is as defined in Table 8.1.2.3.9.2-1A for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.9.2-1B.

**Table 8.1.2.3.9.2-1: Requirement to identify a newly detectable FDD interfrequency cell**

| DRX cycle length (s) | $T_{identify_inter}$ (s) (DRX cycles), normal performance | | $T_{identify_inter}$ (s) (DRX cycles), reduced performance | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 0.256 | $5.12*K_n*N_{freq,n}$ ($20*K_n*N_{freq,n}$) | $7.68*K_n*N_{freq,n}$ ($30*K_n*N_{freq,n}$) | $5.12*K_r*N_{freq,r}$ ($20*K_r*N_{freq,r}$) | $7.68*K_r*N_{freq,r}$ ($30*K_r*N_{freq,r}$) |
| 0.32 | $6.4*K_n*N_{freq,n}$ ($20*K_n*N_{freq,n}$) | $7.68*K_n*N_{freq,nl}$ ($24*K_n*N_{freq,n}$) | $6.4*K_r*N_{freq,r}$ ($20*K_r*N_{freq,r}$) | $7.68*K_r*N_{freq,r}$ ($24*K_r*N_{freq,r}$) |
| 0.32< DRX-cycle≤2.56 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.3.9.2-1A: Requirement to identify a newly detectable FDD inter-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter}$ (s) (eDRX_CONN cycles), normal performance | | $T_{identify_inter}$ (s) (eDRX_CONN cycles), reduced performance | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56< eDRX_CONN cycle≤10.24 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

**Table 8.1.2.3.9.2-1B: Requirement to identify a newly detectable FDD inter-frequency cell when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{identify_inter}$ | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 0.16< DRX-cycle<2.56 | $20*N_{freq}*(T_{burst}/480)$ | $20*N_{freq}*(T_{burst}/480)$ | $20*N_{freq}*(T_{burst}/480)$ | $20*N_{freq}*(T_{burst}/480)$ |

For UE other than category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,

- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- SCH_RP|$_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable provided following conditions are fulfilled:

- RSRP|$_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.3 and 9.1.3.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.5 and 9.1.6.6 are fulfilled for a corresponding Band,
- SCH_RP|$_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.1.2.3.9.2-2, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.9.2-3 for GP0 and GP1. If UE is configured with nonUniform1 – nonUniform4 $T_{identify_inter}$ is as defined in Table 8.1.2.3.9.2-4.

**Table 8.1.2.3.9.2-2: Requirement to measure FDD interfrequency cells**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal performance) | $T_{measure_inter}$ (s) (DRX cycles) (reduced performance) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 0.128 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 0.128<DRX-cycle≤2.56 | Note ($5*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.9.2-3: Requirement to measure FDD inter-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal performance) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced performance) |
|---|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

**Table 8.1.2.3.9.2-4: Requirement to measure FDD inter-frequency cells when non-uniform gap pattern nonUniform1 – nonUniform4 is used**

| DRX_CONN cycle length (s) | $T_{measure_inter}$ | | | |
|---|---|---|---|---|
| | $T_{burst}$ = 1280 ms | $T_{burst}$ = 2560 ms | $T_{burst}$ = 5120 ms | $T_{burst}$ = 10240 ms |
| DRX-cycle ≤2.56 | $5*N_{freq}*(T_{burst}/480)$ | $5*N_{freq}*(T_{burst}/480)$ | $5*N_{freq}*(T_{burst}/480)$ | $5*N_{freq}*(T_{burst}/480)$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.1 and 9.1.3.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.1 and 9.1.6.2, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.17.3.1 and 9.1.17.3.2.

For category 1bis UE, when DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.1.2.3.9.2-5, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.1.2.3.9.2-6.

**Table 8.1.2.3.9.2-5: Requirement to measure FDD interfrequency cells (category 1bis UE)**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) (normal performance) | $T_{measure_inter}$ (s) (DRX cycles) (reduced performance) |
|---|---|---|
| ≤0.08 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 1.28 | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable | Non DRX Requirements in clause 8.1.2.3.9.1 are applicable |
| 1.28<DRX-cycle≤2.56 | Note ($10*K_n*N_{freq,n}$) | Note ($10*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.1.2.3.9.2-6: Requirement to measure FDD inter-frequency cells when eDRX_CONN cycle is used (category 1bis UE)**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (normal performance) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) (reduced performance) |
|---|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($10*K_n*N_{freq,n}$) | Note ($5*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.3 and 9.1.3.4 and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.5 and 9.1.6.6.

### 8.1.2.3.9.2.1 Measurement Reporting Requirements

#### 8.1.2.3.9.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

#### 8.1.2.3.9.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.3.9.2.1.3.

#### 8.1.2.3.9.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay

uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter}$ defined in clause 8.1.2.3.9.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter}$ defined in clause 8.1.2.3.9.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measure_inter}$ defined in clause 8.1.2.3.9.2 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.3.10 E-UTRAN TDD – FDD inter frequency measurements with FeMBMS/Unicast mixed cells

Requirements in this section apply for UE configured to perform inter-frequency measurements on a carrier with one or more FeMBMS/Unicast mixed cells and which are capable of receiving unicast from the FeMBMS/Unicast mixed cell and are capable of receiving at least one of *SystemInformationBlockType15* or *fembms-MixedCarrier-r14* indication and are provided with the information that one or more FeMBMS/Unicast mixed cells are present on the FDD inter-frequency to be measured.

##### 8.1.2.3.10.1 E-UTRAN TDD – FDD inter frequency measurements with FeMBMS/Unicast mixed cells when no DRX is used

The requirements in clause 8.1.2.3.9.1 also apply for this section, where the minimum number of cells and the minimum number of inter-frequencies that the UE shall be able to measure on include also FeMBMS/Unicast mixed cells and the inter-frequencies with and without such cells.

##### 8.1.2.3.10.2 E-UTRAN TDD – FDD inter frequency measurements with FeMBMS/Unicast mixed cells when DRX is used

When DRX or eDRX_CONN cycle is used, the requirements in clause 8.1.2.3.9.2 shall also apply for this section, where the minimum number of cells and the minimum number of inter-frequencies that the UE shall be able to measure on include also FeMBMS/Unicast mixed cells and the inter-frequencies with and without such cells.

### 8.1.2.4 Inter RAT measurements

The requirements in this section shall also appy, when the UE is configured to perform SRS carrier based switching and using measurement gaps.

#### 8.1.2.4.1 E-UTRAN FDD – UTRAN FDD measurements

##### 8.1.2.4.1.1 E-UTRAN FDD – UTRAN FDD measurements when no DRX is used

###### 8.1.2.4.1.1.1 Identification of a new UTRA FDD cell

When explicit neighbour list is provided and no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot K_n \cdot N_{freq,n} \quad ms \text{ (normal performance),}$$

and

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot K_r \cdot N_{freq,r} \quad ms \text{ (reduced performance)}$$

A cell shall be considered detectable when

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

#### 8.1.2.4.1.1.1a Enhanced UTRA FDD cell identification requirements

When explicit neighbour list is provided and no DRX is used or when DRX cycle length $\leq$ 40 ms, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within $T_{identify,\ enhanced_UTRA_FDD}$:

$$T_{identify,enhanced_UTRA_FDD} = (T_{basic_identify_enhanced_UTRA_FDD} \cdot \frac{480}{T_{inter1}} + 480)\, K_n N_{freq,n} \quad ms \text{ (normal performance)}$$

and

$$T_{identify,enhanced_UTRA_FDD} = (T_{basic_identify_enhanced_UTRA_FDD} \cdot \frac{480}{T_{inter1}} + 480)\, K_r N_{freq,r} \quad ms \text{ (reduced performance)}$$

A cell shall be considered detectable when:

- CPICH Ec/Io $\geq$ -15 dB,
- SCH_Ec/Io $\geq$ -15 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

#### 8.1.2.4.1.1.2 UE UTRA FDD CPICH measurement capability

When measurement gaps are scheduled for UTRA FDD inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in Clause 9.2 with measurement period given by

$$T_{measurement_UTRA_FDD} = Max\left\{T_{Measurement_Period\ UTRA_FDD}, T_{basic_measurement_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot K_n \cdot N_{freq,n}\right\} ms \text{ (normal}$$

performance),

and

$$T_{measurement_UTRA_FDD} = Max\left\{T_{Measurement_Period\ UTRA_FDD}, T_{basic_measurement_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot K_r \cdot N_{freq,r}\right\} ms \text{ (reduced}$$

performance)

The UE shall be capable of performing UTRA FDD CPICH measurements for $X_{basic\ measurementUTRA_FDD}$ inter-frequency cells per FDD frequency and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_\ UTRA_FDD.}$

$X_{basic\ measurement\ UTRA_FDD} = 6$

$T_{Measurement_Period\ UTRA_FDD}$ = 480 ms. The period used for calculating the measurement period $T_{measurement_UTRA_FDD}$ for UTRA FDD CPICH measurements.

$T_{basic_identify_UTRA_FDD}$ = 300 ms. This is the time period used in the inter RAT equation in clause 8.1.2.4.1.1.1 where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

$T_{basic_identify_enhanced_UTRA_FDD}$ = 60 ms. This is the time period used in the inter RAT equation in clause 8.1.2.4.1.1.1a where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

$T_{basic_measurement_UTRA_FDD}$ = 50 ms. This is the time period used in the equation for defining the measurement period for inter RAT CPICH measurements.

$N_{freq,\ n}$, $N_{freq,r}$ ,$K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1

#### 8.1.2.4.1.1.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.1.1.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,\ UTRA_FDD}$ defined in Clause 8.1.2.4.1.1.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_FDD}$ defined in Clause 8.1.2.4.1.1.1a for the enhanced requirements When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_FDD}$ defined in clause 8.1.2.4.1.1.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_FDD}$ defined in Clause 8.1.2.4.1.1.1a for the enhanced requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_FDD}$ defined in clause 8.1.2.4.1.1.2 provided the timing to that cell has not changed more than ± 32 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.1.1.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.1.1.4.

### 8.1.2.4.1.2 E-UTRAN FDD – UTRAN FDD measurements when DRX is used

When explicit neighbour list is provided and DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the neighbour cell list within $T_{identify,UTRA_FDD}$. When DRX is used, $T_{identify,UTRA_FDD}$ is as defined in table 8.1.2.4.1.2-1, and when eDRX_CONN is used, $T_{identify,UTRA_FDD}$ is as defined in table 8.1.2.4.1.2-1A.

**Table 8.1.2.4.1.2-1: Requirement to identify a newly detectable UTRA FDD cell**

| DRX cycle length (s) | $T_{identify_UTRA_FDD}$ (s) (DRX cycles) normal requirement | | $T_{identify_UTRA_FDD}$ (s) (DRX cycles) reduced requirement | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.04 | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable |
| 0.064 | $2.56*K_n*N_{freq,n}$ ($40*Nf_{freq,n}$) | $4.8*K_n*N_{freq,n}$ ($75*K_n*N_{freq,n}$) | $2.56*K_r*N_{freq,r}$ ($40*K_r*Nf_{freq,r}$) | $4.8*K_r*N_{freq,r}$($75*K_r*N_{freq,r}$) |

| | | | | |
|---|---|---|---|---|
| 0.08 | 3.2* $K_n$* $N_{freq,n}$ (40* $K_n$* $N_{freq,n}$) | 4.8* $K_n$* $N_{freq,n}$ (60* $K_n$* $N_{freq,n}$) | 3.2* $K_r$* $N_{freq,r}$ (40* $K_r$* $N_{freq,r}$) | 4.8* $K_r$* $N_{freq,r}$ (60* $K_r$* $N_{freq,r}$) |
| 0.128 | 3.2* $K_n$* $N_{freq,n}$ (25* $K_n$* Nfreq) | 4.8* $K_n$* $N_{freq,n}$ (37.5* $K_n$* $N_{freq,n}$) | 3.2* $K_r$* $N_{freq,n}$ (25* $K_r$* $N_{freq,r}$) | 4.8* $K_r$* $N_{freq,r}$ (37.5* $K_r$* $N_{freq,r}$) |
| 0.16 | 3.2* $K_n$* $N_{freq,n}$ (20* $K_n$* $N_{freq,n}$) | 4.8* $K_n$* $N_{freq,n}$ (30* $K_n$* $N_{freq,n}$) | 3.2* $K_r$* $N_{freq,n}$ (20* $K_r$* $N_{freq,r}$) | 4.8* $K_r$* $N_{freq,r}$ (30* $K_r$* $N_{freq,r}$) |
| 0.16<DRX-cycle≤2.56 | Note (20* $K_n$* $N_{freq,n}$) | Note (20* $K_n$* $N_{freq,n}$) | Note (20* $K_r$* $N_{freq,r}$) | Note (20* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.1.2-1A: Requirement to identify a newly detectable UTRA FDD cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_UTRA_FDD}$ (s) (eDRX_CONN cycles) normal requirement | | $T_{identify_UTRA_FDD}$ (s) (eDRX_CONN cycles) reduced requirement | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle≤10.24 | Note (20* $K_n$* $N_{freq,n}$) | Note (20* $K_n$* $N_{freq,n}$) | Note (20* $K_r$* $N_{freq,r}$) | Note (20* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

A cell shall be considered detectable provided following conditions are fulfilled: A cell shall be considered detectable when

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

When DRX or eDRX_CONN is used, the UE shall be capable of performing RSCP and Ec/Io measurements of at least 6 UTRA cells per UTRA FDD carrier for up to 3 UTRA FDD carriers and the UE physical layer shall be capable of reporting RSCP and Ec/Io measurements to higher layers within the measurement period $T_{measure_UTRA_FDD}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. UE supporting Increased UE carrier monitoring UTRA shall be capable of performing RSCP and Ec/Io measurements of at least 6 UTRA cells per UTRA FDD carrier for up to 6 UTRA FDD carriers with maximum of 80 cells consisting of at most 32 cells per frequency layer in the neighbour cell list. When DRX is used, $T_{measure_UTRA_FDD}$ is defined in Table 8.1.2.3.1.2-2, and when eDRX_CONN cycle is used, $T_{measure_UTRA_FDD}$ is defined in Table 8.1.2.3.1.2-3.

**Table 8.1.2.4.1.2-2: Requirement to measure UTRA FDD cells**

| DRX cycle length (s) | $T_{measure_UTRA_FDD}$ (s) (DRX cycles) normal requirement | | $T_{measure_UTRA_FDD}$ (s) (DRX cycles) normal requirement | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.04 | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.1.1 are applicable |
| 0.064 | 0.48*$K_n$* $N_{freq,n}$ (7.5* $K_n$* $N_{freq,n}$) | 0.8* $K_n$* $N_{freq,n}$ (12.5* $K_n$* $N_{freq,n}$) | 0.48* $K_r$* $N_{freq,r}$ (7.5* $K_r$* $N_{freq,r}$) | 0.8* $K_r$* $N_{freq,r}$ (12.5* $K_r$* $N_{freq,r}$) |
| 0.08 | 0.48* $K_n$* $N_{freq,n}$ (6* $K_n$* $N_{freq,n}$) | 0. 8* $K_n$* $N_{freq,n}$ (10* $N_{freq,n}$) | 0.48* $K_r$* $N_{freq,r}$ (6* $K_r$* $N_{freq,r}$) | 0. 8* $K_r$* $N_{freq,r}$ (10* $K_r$* $N_{freq,r}$) |
| 0.128 | 0.64* $K_n$* $N_{freq,n}$ (5* $K_n$* $N_{freq,n}$) | 0. 8* $K_n$* $N_{freq,n}$ (6.25* $N_{freq,n}$) | 0.64* $K_r$* $N_{freq,r}$ (5* $K_r$* $N_{freq,r}$) | 0. 8* $K_r$* $N_{freq,r}$ (6.25* $N_{freq,r}$) |

| | | | | |
|---|---|---|---|---|
| 0.128<DRX-cycle≤2.56 | Note (5* $K_n$* $N_{freq,n}$) | Note (5* $K_n$* $N_{freq,n}$) | Note (5* $K_r$* $N_{freq,r}$) | Note (5* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.1.2-3: Requirement to measure UTRA FDD cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_UTRA_FDD}$ (s) (eDRX_CONN cycles) normal requirement | | $T_{measure_UTRA_FDD}$ (s) (eDRX_CONN cycles) normal requirement | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle≤10.24 | Note (5* $K_n$* $N_{freq,n}$) | Note (5* $K_n$* $N_{freq,n}$) | Note (5* $K_r$* $N_{freq,r}$) | Note (5* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.

#### 8.1.2.4.1.2.1 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.1.2.2 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,UTRA_FDD}$ defined in Clause 8.1.2.4.1.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_FDD}$ defined in clause 8.1.2.4.1.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_FDD}$ defined in clause 8.1.2.4.1.2 provided the timing to that cell has not changed more than ± 32 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.1.2.3 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.1.2.2.

### 8.1.2.4.2 E-UTRAN TDD – UTRAN FDD measurements

The requirements in clause 8.1.2.4.1 also apply for this section.

#### 8.1.2.4.2.1 E-UTRAN TDD – UTRAN FDD measurements when no DRX is used

#### 8.1.2.4.2.2 E-UTRAN TDD – UTRAN FDD measurements when DRX is used

### 8.1.2.4.3 E-UTRAN TDD – UTRAN TDD measurements

#### 8.1.2.4.3.1 E-UTRAN TDD – UTRAN TDD measurements when no DRX is used

##### 8.1.2.4.3.1.1 Identification of a new UTRA TDD cell

When explicit neighbour list is provided and no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{identify,\,UTRA_TDD} = Max\left\{5000, T_{basicidentifyUTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_n \cdot N_{freq,n}\right\} ms \text{ (normal performance),}$$

and

$$T_{identify,\,UTRA_TDD} = Max\left\{5000, T_{basicidentifyUTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_r \cdot N_{freq,r}\right\} ms \text{ (reduced performance)}$$

A cell shall be considered detectable when

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

##### 8.1.2.4.3.1.1a Enhanced UTRA TDD cell identification requirements

When explicit neighbour list is provided and no DRX is used or when DRX cycle length $\leq$ 40 ms, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within $T_{identify,\,enhanced_UTRA_TDD}$:

$$T_{identify,enhanced_UTRA_TDD} = (T_{basic_identify_enhanced_UTRA_TDD} \cdot \frac{480}{T_{inter1}} + 480) \cdot K_n \cdot N_{freq,n} \quad ms \text{ (normal performance),}$$

and

$$T_{identify,enhanced_UTRA_TDD} = (T_{basic_identify_enhanced_UTRA_TDD} \cdot \frac{480}{T_{inter1}} + 480) \cdot K_r \cdot N_{freq,r} \quad ms \text{ (reduced performance)}$$

A cell shall be considered detectable when:

- P-CCPCH_Ec/Io $\geq$ -6 dB,
- DwPCH_Ec/Io $\geq$ -1 dB

When L3 filtering is used an additional delay can be expected.

##### 8.1.2.4.3.1.2 UE UTRA TDD P-CCPCH RSCP measurement capability

When measurement gaps are scheduled for UTRA TDD inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in Clause 9.3 with measurement period given by

$$T_{measurement\ UTRA_TDD} = Max\left\{T_{Measurement_Period\ UTRA_TDD}, T_{basic\ measurement\ UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_n \cdot N_{freq,n}\right\} ms \text{ (normal performance)}$$

$$T_{measurement\ UTRA_TDD} = Max\left\{T_{Measurement_Period\ UTRA_TDD}, T_{basic\ measurement\ UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_r \cdot N_{freq,r}\right\} ms \text{ (reduced performance)}$$

The UE shall be capable of performing UTRA TDD P-CCPCH RSCP measurements for $X_{basic\ measurementUTRA_TDD}$ inter-frequency cells per TDD frequency of the monitored set, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_UTRA_TDD}$.

$X_{basic\ measurementUTRA_TDD} = 6$

$T_{Measurement_Period\ UTRA_TDD}$ = 480 ms is the period used for calculating the measurement period $T_{measurement_UTRA_TDD}$ for UTRA TDD P-CCPCH RSCP measurements.

$T_{basic_identify_UTRA_TDD}$ = 800 ms is the time period used in the inter RAT equation in clause 8.1.2.4.3.1.1 where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

$T_{basic_identify_enhanced_UTRA_TDD}$ = 80 ms is the time period used in the inter RAT equation in clause 8.1.2.4.3.1.1a where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

$T_{basic_measurement_UTRA_TDD}$ = 50 ms is the time period used in the equation for defining the measurement period for inter RAT P-CCPCH RSCP measurements.

$N_{freq,n}$, $N_{freq,r}$, $K_n$ and $K_r$ are defined in clause 8.1.2.1.1 and $T_{inter1}$ is defined in clause 8.1.2.1

#### 8.1.2.4.3.1.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.3.1.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,\ UTRA_TDD}$ defined in Clause 8.1.2.4.3.1.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_TDD}$ defined in Clause 8.1.2.4.3.1.1a for the enhanced requirements. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_TDD}$ defined in clause 8.1.2.4.3.1.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_TDD}$ defined in clause 8.1.2.4.3.1.2 provided the timing to that cell has not changed more than ± 10 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.3.1.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.3.1.4.

### 8.1.2.4.3.2 E-UTRAN TDD – UTRAN TDD measurements when DRX is used

When explicit neighbour list is provided and DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new

detectable cell belonging to the neighbour cell list within $T_{identify,UTRA_TDD}$. When DRX is used, $T_{identify,UTRA_TDD}$ is as defined in table 8.1.2.4.3.2-1, and when eDRX_CONN is used, $T_{identify,UTRA_TDD}$ is as defined in table 8.1.2.4.3.2-1A.

**Table 8.1.2.4.3.2-1: Requirement to identify a newly detectable UTRA TDD cell**

| DRX cycle length (s) | $T_{identify_UTRA_TDD}$ (s) (DRX cycles) (normal requirement) | | $T_{identify_UTRA_TDD}$ (s) (DRX cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.32 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.32<DRX-cycle≤0.512 | Note ($20*K_n*N_{freq,n}$) | Note ($25*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($25*K_r*N_{freq,r}$) |
| 0.512<DRX-cycle≤2.56 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.3.2-1A: Requirement to identify a newly detectable UTRA TDD cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_UTRA_TDD}$ (s) (eDRX_CONN cycles) (normal requirement) | | $T_{identify_UTRA_TDD}$ (s) (eDRX_CONN cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle ≤10.24 | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_n*N_{freq,n}$) | Note ($20*K_r*N_{freq,r}$) | Note ($20*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

A cell shall be considered detectable provided following conditions are fulfilled: A cell shall be considered detectable when

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing UTRA TDD P-CCPCH RSCP measurements of at least 6 UTRA cells per UTRA TDD carrier for up to 3 UTRA TDD carriers and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period $T_{measure_UTRA_TDD}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. UE supporting Increased UE carrier monitoring UTRA shall be capable of performing UTRA TDD P-CCPCH RSCP measurements of at least 6 UTRA cells per UTRA TDD carrier for up to 7 UTRA TDD carriers with maximum of 80 cells consisting of at most 32 cells per frequency layer in the neighbour cell list. When DRX is used, $T_{measure_UTRA_TDD}$ is as defined in Table 8.1.2.4.3.2-2, and when eDRX_CONN is used, $T_{measure_UTRA_TDD}$ is as defined in Table 8.1.2.4.3.2-3.

**Table 8.1.2.4.3.2-2: Requirement to measure UTRA TDD cells**

| DRX cycle length (s) | $T_{measure_UTRA_TDD}$ (s) (DRX cycles) (normal requirement) | | $T_{measure_UTRA_TDD}$ (s) (DRX cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.04 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.064 | $0.48*K_n*N_{freq,n}$ ($7.5*K_n*N_{freq,n}$) | $0.8*K_n*N_{freq,n}$ ($12.5*K_n*N_{freq,n}$) | $0.48*K_r*N_{freq,r}$ ($7.5*K_r*N_{freq,r}$) | $0.8*K_r*N_{freq,r}$ ($12.5*K_r*N_{freq,r}$) |
| 0.08 | $0.48*K_n*N_{freq,n}$ ($6*K_n*N_{freq,n}$) | $0.8*K_n*N_{freq,n}$ ($10*K_n*N_{freq,n}$) | $0.48*K_r*N_{freq,r}$ ($6*K_r*N_{freq,r}$) | $0.8*K_r*N_{freq,r}$ ($10*K_r*N_{freq,r}$) |

| | | | | |
|---|---|---|---|---|
| 0.128 | 0.64*$K_n$ *$N_{freq,n}$ (5*$K_n$ *$N_{freq,n}$) | 0. 8*$K_n$ *$N_{freq,n}$ (6.25*$K_n$ *$N_{freq,n}$) | 0.64* $K_r$* $N_{freq,r}$ (5* $K_r$* $N_{freq,r}$) | 0. 8* $K_r$* $N_{freq,r}$ (6.25* $N_{freq,r}$) |
| 0. 128<DRX-cycle≤2.56 | Note (5*$K_n$ *$N_{freq,n}$) | Note (5*$K_n$ *$N_{freq,n}$) | Note (5* $K_r$* $N_{freq,r}$) | Note (5* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.3.2-3: Requirement to measure UTRA TDD cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_UTRA_TDD}$ (s) (eDRX_CONN cycles) (normal requirement) | | $T_{measure_UTRA_TDD}$ (s) (eDRX_CONN cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle≤10.24 | Note (5*$K_n$ *$N_{freq,n}$) | Note (5*$K_n$ *$N_{freq,n}$) | Note (5* $K_r$* $N_{freq,r}$) | Note (5* $K_r$* $N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.

#### 8.1.2.4.3.2.1 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.3.2.2 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,\ UTRA_TDD}$ defined in Clause 8.1.2.4.3.2 When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_TDD}$ defined in clause 8.1.2.4.3.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_TDD}$ defined in clause 8.1.2.4.3.2 provided the timing to that cell has not changed more than ± 10 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.3.2.3 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.3.2.2.

### 8.1.2.4.4 E-UTRAN FDD – UTRAN TDD measurements

The requirements in clause 8.1.2.4.3 also apply for this section.

### 8.1.2.4.5 E-UTRAN FDD – GSM measurements

#### 8.1.2.4.5.1 E-UTRAN FDD – GSM measurements when no DRX is used

The requirements in this clause apply only to UE supporting E-UTRAN FDD and GSM.

Measurements on GSM cells can be requested with BSIC verified.

In RRC_CONNECTED state when a supported measurement gap pattern sequence according to Table 8.1.2.1-1 is configured by E-UTRAN, or the UE supports capability of conducting such measurements without gaps, the UE shall continuously measure GSM cells, search for new GSM cells given in the monitored set and re-confirm the BSIC for already detected cells.

##### 8.1.2.4.5.1.1 GSM carrier RSSI

This measurement shall be based on measurement gaps allocated for GSM carrier RSSI measurement as described in clause 8.1.2.1. A UE supporting GSM measurements shall measure minimum number of 10 GSM carrier RSSI measurement samples ($N_{GSM\ carrier\ RSSI}$) per measurement gap. In RRC_CONNECTED state the measurement period, $T_{Measurement\ Period,\ GSM}$, for the GSM carrier RSSI measurement is $K_n*N_{freq,n}$ *480 ms. The parameters $N_{freq,n}$ and $K_n$ are defined in clause 8.1.2.1.1.

The UE shall meet the measurement accuracy requirements stated for RXLEV in [8], when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

##### 8.1.2.4.5.1.2 BSIC verification

Measurements on a GSM cell can be requested with BSIC verified. The UE shall be able to report the GSM cells with BSIC verified for those cells where the verification of BSIC has been successful.

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

- **Initial BSIC identification:** Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the E-UTRAN FDD and GSM cells. The UE shall trigger the initial BSIC identification within the available measurement gap pattern sequence. The requirements for BSIC re-confirmation can be found in clause 8.1.2.4.5.1.2.1.

- **BSIC re-confirmation:** Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available measurement gap pattern. The requirements for BSIC re-confirmation can be found in clause 8.1.2.4.5.1.2.2.

If the network requests measurements on a GSM cell the UE shall behave as follows:

- The UE shall perform GSM carrier RSSI measurements according to clause 8.1.2.4.5.1 when a measurement gap pattern sequence is activated, or the UE supports capability of conducting such measurements without gaps.

The UE shall perform measurement reporting as defined in TS 36.331 [2].

- The UE shall perform BSIC identification. The UE shall use the most recently available GSM carrier RSSI measurement results for arranging GSM cells in signal strength order for performing BSIC identification.

- The UE shall perform BSIC re-confirmation on all the GSM cells that have been successfully identified.

- The UE shall perform all configured event evaluation for event-triggered reporting after the BSIC has been verified for a GSM cell. The UE shall use the most recently available GSM carrier RSSI measurement results in event evaluation and event-triggered reporting.

- Event-triggered and periodic reports shall be triggered according to TS 36.331 [2].

The BSIC of a GSM cell is considered to be “verified” if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification). Once a GSM cell has been identified the BSIC shall

be re-confirmed at least once every 8*$T_{re\text{-}confirm,GSM}$ seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified". If a measurement gap pattern sequence is deactivated by the network after BSIC has been identified or verified, the UE shall consider the BSIC as non-verified.

$T_{identify,GSM}$ indicates the maximum time allowed for the UE to decode the unknown BSIC of the GSM cell in one GSM BCCH carrier in the initial BSIC identification procedure.

$T_{re\text{-}confirm,GSM}$ indicates the maximum time allowed for the re-confirmation of the BSIC of one GSM cell in the BSIC re-confirmation procedure.

The UE shall be able to decode a BSIC within a measurement gap when the time difference between the middle of the received GSM synchronisation burst at the UE and the middle of the effective measurement gap is within the limits specified in table 8.1.2.4.5.1.2-1.

**Table 8.1.2.4.5.1.2-1: The gap length and maximum time difference for BSIC verification**

| Gap length [ms] | Maximum time difference [µs] |
|---|---|
| 6 | ± 2350 µs |

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in [9].

#### 8.1.2.4.5.1.2.1 Initial BSIC identification

This measurement shall be based on the measurement gaps used for Initial BSIC identification as described in clause 8.1.2.4.5.1.2.

The UE shall continuously attempt to decode the BSIC of SCH on the BCCH carrier of the 8 strongest BCCH carriers of the GSM cells indicated in the Inter-RAT cell info list. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BCCH carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall immediately continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within $T_{identify,GSM}$ ms, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall continue to try to perform BSIC identification of the next GSM BCCH carrier in signal strength order. The GSM BCCH carrier for which the BSIC identification failed shall not be re-considered for BSIC identification until BSIC identification attempts have been made for all the rest of the 8 strongest GSM BCCH carriers in the monitored set with unknown BSIC.

$T_{identify,GSM}$ values are given for a set of reference gap patterns in table 8.1.2.4.5.1.2.1-1. The requirements in the table represent the time required to guarantee at least two attempts to decode the BSIC for one GSM BCCH carrier. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $T_{identify,GSM}$ shall be based on the 80ms gap configuration.

**Table 8.1.2.4.5.1.2.1-1**

| ceil($N_{freq,n}$ * $K_n$ – $M_{gsm}$) | $T_{identify,gsm}$(ms) | | $T_{reconfirm,gsm}$(ms) | |
|---|---|---|---|---|
| | 40ms gap configuration (ID 0) | 80ms gap configuration (ID 1) | 40ms gap configuration (ID 0) | 80ms gap configuration (ID 1) |
| 0 | 2160 | 5280 | 1920 | 5040 |
| 1 | 5280 | 21760 | 5040 | 17280 |
| 2 | 5280 | 31680 | 5040 | 29280 |
| 3 | 19440 | No requirement | 13320 | No requirement |
| 4 | 31680 | No requirement | 29280 | No requirement |
| 5 | 31680 | No requirement | 29280 | No requirement |

#### 8.1.2.4.5.1.2.2 BSIC re-confirmation

The UE shall maintain the timing information of up to 8 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For each measurement gap used for GSM BSIC reconfirmation as described in clause 8.1.2.4.5.1.2, the UE shall attempt to decode the BSIC falling within the measurement gap according to table 8.1.2.4.5.1.2.1-1. If more than one BSIC can be decoded within the same measurement gap, priority shall be given to the least recently decoded BSIC. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $T_{re\text{-}confirm,GSM}$ shall be based on the 80ms gap configuration.

If the UE fails to decode the BSIC after two successive attempts or if the UE has not been able to re-confirm the BSIC for a GSM cell within $T_{re\text{-}confirm,GSM}$ seconds, the UE shall abort the BSIC re-confirmation attempts for that GSM cell. The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see clause 8.1.2.4.5.1.2.1.

#### 8.1.2.4.5.1.2a Enhanced BSIC verification

In addition to the BSIC verification requirements in clause 8.1.2.4.5.1.2, when the UE receives the GSM cell at levels down to 10 dB + the reference sensitivity level or reference interference levels as specified in [9] the BSIC identification requirement in table 8.1.2.4.5.1.2a-1 applies. The BSIC verification requirements in table 8.1.2.4.5.1.2a-1 shall apply when no DRX is used or when DRX cycle length ≤ 40 ms.

**Table 8.1.2.4.5.1.2a-1**

| | **$T_{enhanced_identify,gsm}$(ms)** | | **$T_{enhanced_reconfirm,gsm}$(ms)** | |
|---|---|---|---|---|
| **ceil($N_{freq,n}$ * $K_n$ – $M_{gsm}$)** | **40ms gap configuration (ID 0)** | **40ms gap configuration when interfrequency RSTD measurement is also configured and the UE requires measurement gaps for performing such measurements** | **40ms gap configuration (ID 0)** | **40ms gap configuration when interfrequency RSTD measurement is also configured and the UE requires measurement gaps for performing such measurements** |
| 0 | 1320 | 2160 | 1080 | 1920 |

#### 8.1.2.4.5.1.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.5.1.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH.

The event triggered reporting delay requirement is valid when the UE for each GSM carrier in the monitored set can take the required number of samples during the measurement period $T_{Measurement\ Period,\ GSM}$ (see clause 8.1.2.4.5.1).

The event triggered measurement reporting delay for a GSM cell with verified BSIC , measured without L3 filtering shall be less than $2*T_{Measurement\ Period,\ GSM}$, where $T_{Measurement\ Period,\ GSM}$ is defined in clause 8.1.2.4.5.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct

Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.5.1.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.5.1.4.

### 8.1.2.4.5.2 E-UTRAN FDD – GSM measurements when DRX is used

The requirements in this clause apply only to UE supporting E-UTRAN FDD and GSM.

Measurements on GSM cells can be requested with BSIC verified.

In RRC_CONNECTED state when a supported measurement gap pattern sequence according to Table 8.1.2.1-1 is configured by E-UTRAN, or the UE supports capability of conducting such measurements without gaps, the UE shall continuously measure GSM cells, search for new GSM cells given in the monitored set and re-confirm the BSIC for already detected cells. During DRX or eDRX_CONN periods the UE may use other periods of time outside the specified measurement gap patterns. The UE is not required to make measurements of GSM cells during DRX or eDRX_CONN periods if a measurement gap pattern has not been configured, unless the UE supports capability of conducting such measurements without gaps.

#### 8.1.2.4.5.2.1 GSM carrier RSSI

This measurement shall be based on measurement gaps allocated for GSM carrier RSSI measurement as described in clause 8.1.2.1. A UE supporting GSM measurements shall measure minimum number of 10 GSM carrier RSSI measurement samples ($N_{GSM\ carrier\ RSSI}$) per DRX or eDRX_CONN cycle. When DRX is used in RRC_CONNECTED state, the measurement period, $T_{Measurement\ Period,\ GSM}$, for the GSM carrier RSSI measurement is shown in table 8.1.2.4.5.2.1-1. When eDRX_CONN is used in RRC_CONNECTED state, the measurement period, $T_{Measurement\ Period,\ GSM}$, for the GSM carrier RSSI measurement is shown in table 8.1.2.4.5.2.1-2. The parameters $N_{freq,n}$ and $K_n$ are defined in clause 8.1.2.1.1.

**Table 8.1.2.4.5.2.1-1: GSM measurement period for large DRX**

| DRX cycle length (s) | $T_{measure,GSM}$ (s) (DRX cycles) |
|---|---|
| ≤0.064 | Non DRX Requirements are applicable |
| 0.064<DRX-cycle≤ 0.08 | Note ($6*K_n*N_{freq,n}$) |
| 0.08<DRX-cycle≤ 2.56 | Note ($5*K_n*N_{freq,n}$) |
| Note: Time depends upon the DRX cycle in use | |

**Table 8.1.2.4.5.2.1-2: GSM measurement period for large DRX when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure,GSM}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5*K_n*N_{freq,n}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The UE shall meet the measurement accuracy requirements stated for RXLEV in [8], when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

#### 8.1.2.4.5.2.2 BSIC verification

Measurements on a GSM cell can be requested with BSIC verified. The UE shall be able to report the GSM cells with BSIC verified for those cells where the verification of BSIC has been successful.

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

- **Initial BSIC identification:** Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the E-UTRAN FDD and GSM cells.
- **BSIC re-confirmation:** Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available measurement gap pattern

If the network requests measurements on a GSM cell, the UE shall behave as follows:

- The UE shall perform GSM carrier RSSI measurements according to clause 8.1.2.4.5.2.1 when a measurement gap pattern sequence is activated, or the UE supports capability of conducting such measurements without gaps.

The UE shall perform measurement reporting as defined in TS 36.331 [2].

- The UE shall perform BSIC identification. The UE shall use the most recently available GSM carrier RSSI measurement results for arranging GSM cells in signal strength order for performing BSIC identification.
- The UE shall perform BSIC re-confirmation on all the GSM cells that have been successfully identified.
- The UE shall perform all configured event evaluation for event-triggered reporting after the BSIC has been verified for a GSM cell. The UE shall use the most recently available GSM carrier RSSI measurement results in event evaluation and event-triggered reporting.
- Event-triggered and periodic reports shall be triggered according to TS 36.331 [2].

The BSIC of a GSM cell is considered to be “verified” if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification). Once a GSM cell has been identified the BSIC shall be re-confirmed at least once every 30 seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified".

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in [9].

##### 8.1.2.4.5.2.2.1 Initial BSIC identification

This measurement shall be made on GSM cells that are requested with BSIC verified.

For DRX cycle length ≤ 40 ms, the initial GSM BSIC identification requirements corresponding to the non DRX requirements as specified in clause 8.1.2.4.5.1.2.1 shall apply.

For DRX cycle length > 40 ms and any eDRX_CONN cycle, the UE shall make at least one attempt every $K_n$*$N_{freq,n}$ *30s to decode the BSIC of SCH on the BCCH carrier of the 8 strongest BCCH carriers of the GSM cells indicated in the Inter-RAT cell info list. If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within $K_n$*$N_{freq,n}$ *60 s, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BCCH carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value. The parameters $N_{freq,n}$ and $K_n$ are defined in clause 8.1.2.1.1.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

##### 8.1.2.4.5.2.2.2 BSIC re-confirmation

The UE shall maintain the timing information of up to 8 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For DRX cycle length ≤ 40 ms, the GSM BSIC re-conformation requirements corresponding to the non DRX requirements as specified in clause 8.1.2.4.5.1.2.2 shall apply.

For DRX cycle length > 40 ms and any eDRX_CONN cycle, at least every $K_n$*$N_{freq,n}$ *30 seconds, the UE shall attempt to decode the BSIC of each identified GSM cell.If the UE fails to decode the BSIC after two successive attempts or if the UE has not been able to re-confirm the BSIC for a GSM cell within $K_n$*$N_{freq,n}$ *60 seconds, the UE shall abort the BSIC re-confirmation attempts for that GSM cell. The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see clause 8.1.2.4.5.2.2.1. The parameters $N_{freq,n}$ and $k_n$ are defined in clause 8.1.2.1.1.

#### 8.1.2.4.5.2.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.5.2.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH.

The event triggered reporting delay requirement is valid when the UE for each GSM carrier in the monitored set can take the required number of samples during the measurement period $T_{Measurement\ Period,\ GSM}$ (see clause 8.1.2.4.5.2.1).

The event triggered measurement reporting delay for a GSM cell with verified BSIC , measured without L3 filtering shall be less than 2*$T_{Measurement\ Period,\ GSM}$, where $T_{Measurement\ Period,\ GSM}$ is defined in clause 8.1.2.4.5.2.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.5.2.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.5.2.4.

### 8.1.2.4.6 E-UTRAN TDD – GSM measurements

The requirements in clause 8.1.2.4.5 also apply for this section.

### 8.1.2.4.7 E-UTRAN FDD – UTRAN FDD measurements for SON

#### 8.1.2.4.7.1 Identification of a new UTRA FDD cell for SON

No explicit neighbour list is provided to the UE for identifying a UTRA cell for SON. The UE shall identify and report only the strongest cell when requested by the network for the purpose of SON.

##### 8.1.2.4.7.1.1 Requirements when no DRX is used

When no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within:

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{Tinter1} \cdot K_n N_{freq,n} \quad ms \text{ (normal performance)}$$

and

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{Tinter1} \cdot K_r N_{freq,r} \quad ms \text{ (reduced performance)}$$

$T_{basic_identify_UTRA_FDD}$ = 300 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

A cell shall be considered identifiable following conditions are fulfilled:

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA cell for SON within $8*T_{identify,\ UTRA_FDD}$ ms, the UE may stop searching UTRA cells for SON.

#### 8.1.2.4.7.1.2 Requirements when DRX is used

When DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within $T_{identify,\ UTRA_FDD}$. When DRX is used, $T_{identify,\ UTRA_FDD}$ is as defined in table 8.1.2.4.7.1.2-1, and when eDRX_CONN is used, $T_{identify,\ UTRA_FDD}$ is as defined in table 8.1.2.4.7.1.2-2.

**Table 8.1.2.4.7.1.2-1: Requirement to identify a new UTRA FDD cell for SON**

| DRX cycle length (s) | $T_{identify,\ UTRA_FDD}$ (s) (DRX cycles) (normal requirement) | | $T_{identify,\ UTRA_FDD}$ (s) (DRX cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| ≤0.04 | Non DRX Requirements in clause 8.1.2.4.7.1.1are applicable | Non DRX Requirements in clause 8.1.2.4.7.1.1 are applicable | Non DRX Requirements in clause 8.1.2.4.7.1.1are applicable | Non DRX Requirements in clause 8.1.2.4.7.1.1 are applicable |
| 0.04<DRX cycle≤0.08 | Note ($45*K_n*N_{freq,n}$) | Note ($95*K_n*N_{freq,n}$) | Note ($45*K_r*N_{freq,r}$) | Note ($95*K_r*N_{freq,r}$) |
| 0.128 | $3.84*K_n*N_{freq,n}$ ($30*K_n*N_{freq,n}$) | $8.0*K_n*N_{freq,n}$ ($62.5*K_n*N_{freq,n}$) | $3.84*K_r*N_{freq,r}$ ($30*K_r*N_{freq,r}$) | $8.0*K_r*N_{freq,r}$ ($62.5*K_r*N_{freq,r}$) |
| 0.16 | $4.0*K_n*N_{freq,n}$ ($25*K_n*N_{freq,n}$) | $8.0*K_n*N_{freq,n}$ ($50*K_n*N_{freq,n}$) | $4.0*K_r*N_{freq,r}$ ($25*K_r*N_{freq,r}$) | $8.0*K_r*N_{freq,r}$ ($50*K_r*N_{freq,r}$) |
| 0.256 | $6.4*K_n*N_{freq,n}$ ($25*K_n*N_{freq,n}$) | $8.96*K_n*N_{freq,n}$ ($35*K_n*N_{freq,n}$) | $6.4*K_r*N_{freq,r}$ ($25*K_r*N_{freq,r}$) | $8.96*K_r*N_{freq,r}$ ($35*K_r*N_{freq,r}$) |
| 0.32 | $8*K_n*N_{freq,n}$ ($25*K_n*N_{freq,n}$) | $8.96*K_n*N_{freq,n}$ ($28*K_n*N_{freq,n}$) | $8*K_r*N_{freq,r}$ ($25*K_r*N_{freq,r}$) | $8.96*K_r*N_{freq,r}$ ($28*K_r*N_{freq,r}$) |
| 0.32<DRX cycle≤2.56 | Note ($25*K_n*N_{freq,n}$) | Note ($25*K_n*N_{freq,n}$) | Note ($25*K_r*N_{freq,r}$) | Note ($25*K_r*N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.7.1.2-2: Requirement to identify a new UTRA FDD cell for SON when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify,\ UTRA_FDD}$ (s) (eDRX_CONN cycles) (normal requirement) | | $T_{identify,\ UTRA_FDD}$ (s) (eDRX_CONN cycles) (reduced requirement) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle≤10.24 | Note ($25*K_n*N_{freq,n}$) | Note ($25*K_n*N_{freq,n}$) | Note ($25*K_r*N_{freq,r}$) | Note ($25*K_r*N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

A cell shall be considered identifiable provided following conditions are fulfilled:

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA cell for SON within $8*T_{identify,\ UTRA_FDD}$ seconds, the UE may stop searching UTRA cells for SON; when DRX is used $T_{identify,\ UTRA_FDD}$ is defined in table 8.1.2.4.7.1.2-1, and when eDRX_CONN is used $T_{identify,\ UTRA_FDD}$ is defined in table 8.1.2.4.7.1.2-2.

#### 8.1.2.4.7.1.3 Reporting Delay

The UE shall not report the physical cell identity of an identifiable cell for SON as long as the reporting criteria are not fulfilled.

The reporting delay is defined as the time between the identification of the strongest cell for SON until the UE starts to transmit its physical cell identity over the Uu interface. This requirement assumes that the reporting of the physical cell identity is not delayed by other RRC signalling on the DCCH. This reporting delay excludes a delay uncertainty resulted when inserting the physical cell identity of the strongest cell for SON to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This reporting delay excludes any delay caused by unavailability of UL resources for UE sending the physical cell identity of the strongest cell for SON.

The reporting delay of the physical cell identity of the strongest cell for SON without L3 filtering shall be less than $T_{identify, UTRA_FDD}$ defined in clause 8.1.2.4.7.1.1 and in clause 8.1.2.4.7.1.2 for non DRX and DRX or eDRX_CONN cases respectively. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.4.8 E-UTRAN TDD – UTRAN FDD measurements for SON

The requirements in clause 8.1.2.4.7 also apply for this section.

### 8.1.2.4.9 E-UTRAN FDD – cdma2000 1xRTT measurements

UE shall perform cdma2000 1xRTT measurements according to the procedure defined in [15] on the cdma2000 1xRTT neighbor cells indicated by the serving eNode B. If measurement gaps are required, the UE shall perform cdma2000 1xRTT measurements only during the measurement gaps configured by the serving eNode B.

### 8.1.2.4.9.1A E-UTRAN FDD – cdma2000 1xRTT measurements when no DRX is used

When measurement gaps are scheduled for CDMA2000 1xRTT inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CDMA2000 1xRTT Pilot Strength measurements to higher layers with measurement accuracy as specified in Clause 9.5, corresponding to a 90% measurement success rate, with measurement period given by

$$T_{measurement_CDMA2000_1x} = T_{basic_measurement_CDMA2000_1x} \cdot N_{freq,n} \cdot K_n \cdot S_{gap}$$

where $T_{basic_measurement_CDMA2000_1x}$ = 100 ms and the measurement gap specific scale factor $S_{gap}$ is based on the measurement gap pattern in use as defined in Table 8.1.2.4.9.1-1. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $S_{gap}$ shall be based to the Gap Pattern Id 1.

**Table 8.1.2.4.9.1-1: Gap Pattern Specific Scale Factor**

| Gap Pattern Id | $S_{gap}$ |
|---|---|
| 0 | 32/3 |
| 1 | 64/3 |

#### 8.1.2.4.9.1 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

The measurement reporting delay of each periodic report is defined as the time between the end of the last measurement period and the moment when the UE starts to transmit the measurement report over the Uu interface. This delay shall be less than $T_{71m}$ defined in [15] for each periodic report. This measurement reporting delay excludes a delay which is caused by the unavailability of the uplink resources for the UE to send the measurement report.

### 8.1.2.4.10 E-UTRAN TDD – cdma2000 1xRTT measurements

The requirements in clause 8.1.2.4.9 also apply for this section.

### 8.1.2.4.11 E-UTRAN FDD – HRPD measurements

UE shall perform HRPD measurements according to the procedure defined in [11] on the HRPD neighbor cells indicated by the serving eNode B. If measurement gaps are required, the UE shall perform HRPD measurements only during the measurement gaps configured by the serving eNode B.

### 8.1.2.4.12 E-UTRAN TDD – HRPD measurements

The requirements in clause 8.1.2.4.11 also apply for this section.

### 8.1.2.4.13 E-UTRAN TDD – UTRAN TDD measurements for SON

#### 8.1.2.4.13.1 Identification of a new UTRA TDD cell for SON

No explicit neighbour list is provided to the UE for identifying a UTRA TDD cell for SON. The UE shall identify and report only the strongest cell when requested by the network for the purpose of SON.

##### 8.1.2.4.13.1.1 Requirements when no DRX is used

When no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within:

$$T_{identify,\ UTRA_TDD} = T_{basic_identify_UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_n \cdot N_{freq,n} \quad ms \text{ (normal performance)}$$

and

$$T_{identify,\ UTRA_TDD} = T_{basic_identify_UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot K_r \cdot N_{freq,r} \quad ms \text{ (reduced performance)}$$

$T_{basic_identify_UTRA_TDD}$ = 800 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

A cell shall be considered identifiable following conditions are fulfilled:

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA TDD cell for SON within $8*T_{identify,\ UTRA_TDD}$ ms, the UE may stop searching UTRA TDD cells for SON.

##### 8.1.2.4.13.1.2 Requirements when DRX is used

When DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within $T_{identify,\ UTRA_TDD}$. When DRX is used, $T_{identify,\ UTRA_TDD}$ is as defined in table 8.1.2.4.13.1.2-1, and when eDRX_CONN is used, $T_{identify,\ UTRA_TDD}$ is as defined in table 8.1.2.4.13.1.2-2.

**Table 8.1.2.4.13.1.2-1: Requirement to identify a new UTRA TDD cell for SON**

| DRX cycle length (s) | $T_{identify,\ UTRA_TDD}$ (s) (DRX cycles) | | $T_{identify,\ UTRA_TDD}$ (s) (DRX cycles) | $T_{identify,\ UTRA_TDD}$ (s) (DRX cycles) |
|---|---|---|---|---|
| | **Gap period = 40 ms** | **Gap period = 80 ms** | **Gap period = 40 ms** | **Gap period = 80 ms** |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.16<DRX cycle≤0.256 | Note ($25*K_n* N_{freq,n}$) | Note ($50*K_n * N_{freq,n}$) | Note ($25*K_r* N_{freq,r}$) | Note ($50*K_r * N_{freq,r}$) |

| | | | | |
|---|---|---|---|---|
| 0.256<DRX cycle≤0.32 | Note ($25*K_n$ * $N_{freq,n}$) | Note ($45*K_n$ * $N_{freq,n}$) | Note ($25*K_r$ * $N_{freq,r}$) | Note ($45*K_r$ * $N_{freq,r}$) |
| 0.32<DRX cycle≤2.56 | Note ($25*K_n$ * $N_{freq,n}$) | Note ($25*K_n$ * $N_{freq,n}$) | Note ($25*K_r$ * $N_{freq,r}$) | Note ($25*K_r$ * $N_{freq,r}$) |
| Note: Time depends upon the DRX cycle in use | | | | |

**Table 8.1.2.4.13.1.2-2: Requirement to identify a new UTRA TDD cell for SON when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify,\ UTRA_TDD}$ (s) (eDRX_CONN cycles) | | $T_{identify,\ UTRA_TDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|---|---|
| | Gap period = 40 ms | Gap period = 80 ms | Gap period = 40 ms | Gap period = 80 ms |
| 2.56<eDRX_CONN cycle≤10.24 | Note ($25*K_n$ * $N_{freq,n}$) | Note ($25*K_n$ * $N_{freq,n}$) | Note ($25*K_r$ * $N_{freq,r}$) | Note ($25*K_r$ * $N_{freq,r}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | | | |

A cell shall be considered identifiable provided following conditions are fulfilled:

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA TDD cell for SON within $8*T_{identify,\ UTRA_TDD}$ seconds, the UE may stop searching UTRA TDD cells for SON; when DRX is used $T_{identify,\ UTRA_TDD}$ is defined in table 8.1.2.4.13.1.2-1, and when eDRX_CONN is used $T_{identify,\ UTRA_TDD}$ is defined in table 8.1.2.4.13.1.2-2.

#### 8.1.2.4.13.1.3 Reporting Delay

The UE shall not report the physical cell identity of an identifiable cell for SON as long as the reporting criteria are not fulfilled.

The reporting delay is defined as the time between the identification of the strongest cell for SON until the UE starts to transmit its physical cell identity over the Uu interface. This requirement assumes that the reporting of the physical cell identity is not delayed by other RRC signalling on the DCCH. This reporting delay excludes a delay uncertainty resulted when inserting the physical cell identity of the strongest cell for SON to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This reporting delay excludes any delay caused by unavailability of UL resources for UE sending the physical cell identity of the strongest cell for SON.

The reporting delay of the physical cell identity of the strongest cell for SON without L3 filtering shall be less than $T_{identify,\ UTRA_TDD}$ defined in clause 8.1.2.4.13.1.1 and in clause 8.1.2.4.13.1.2 for non DRX and DRX and eDRX_CONN cases respectively. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.4.14 E-UTRAN FDD – UTRAN TDD measurements for SON

The requirements in clause 8.1.2.4.13 also apply for this section.

### 8.1.2.4.15 E-UTRAN FDD – cdma2000 1xRTT measurements for SON ANR

#### 8.1.2.4.15.1 Identification of a new cdma2000 1xRTT cell for SON ANR

No explicit neighbour list is provided to the UE for identifying a cdma2000 1xRTT cell for SON ANR. The UE shall identify and report only the strongest cell when requested by the network for the purpose of SON ANR.

#### 8.1.2.4.15.1.1 Requirement when no DRX is used

When measurement gaps are scheduled for CDMA2000 1xRTT inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CDMA2000 1xRTT Pilot Strength measurements to higher layers with measurement accuracy as specified in Clause 9.5, corresponding to a 90% measurement success rate, with measurement period given by

$$T_{measurement_CDMA2000_1x} = T_{basic_measurement_CDMA2000_1x} \cdot N_{freq,n} \cdot K_n \cdot S_{gap}$$

where $T_{basic_measurement_CDMA2000_1x}$ = 100 ms and the measurement gap specific scale factor $S_{gap}$ is based on the measurement gap pattern in use as defined in Table 8.1.2.4.15.1.1-1. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $S_{gap}$ shall be based to the Gap Pattern Id 1.

**Table 8.1.2.4.15.1.1-1: Gap Pattern Specific Scale Factor**

| Gap Pattern Id | $S_{gap}$ |
|---|---|
| 0 | 32/3 |
| 1 | 64/3 |

If the UE is unable to identify the CDMA2000 1xRTT cell for SON ANR, the UE may stop searching CDMA2000 1xRTT cells for SON ANR. The time after which the UE may stop searching is up to UE implementation.

#### 8.1.2.4.15.1.2 Reporting Delay

The UE shall not report the physical cell identity of an identifiable cell for SON ANR as long as the reporting criteria are not fulfilled.

The reporting delay is defined as the time between the identification of the strongest cell for SON ANR until the UE starts to transmit its physical cell identity over the Uu interface. This delay shall be less than $T_{71m}$ defined in [15]. This measurement reporting delay excludes a delay which is caused by the unavailability of the uplink resources for the UE to send the measurement report.

### 8.1.2.4.16 E-UTRAN TDD – cdma2000 1xRTT measurements for SON ANR

The requirements in clause 8.1.2.4.15 also apply for this section.

### 8.1.2.4.17 E-UTRAN FDD-UTRAN FDD measurements with autonomous gaps

The requirements in this clause apply only to UE supporting E-UTRA FDD and UTRA FDD.

#### 8.1.2.4.17.1 Identification of a new CGI of UTRA FDD cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of UTRA FDD cell. The UE shall identify and report the CGI when requested by the network for the purpose of 'reportCGI'. The UE may make autonomous gaps in both downlink reception and uplink transmission for decoding SFN and receiving UTRAN MIB and SIB3 messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, the UE shall be able to identify a new CGI of UTRA FDD cell within:

$$T_{identify_CGI,\ UTRAN\ FDD} = 630 + 40*SIB3_REP \text{ ms}$$

where SIB3_REP is the repetition period at which the UTRAN cell schedules SIB3 blocks in units of frames specified in TS 25.331 [7] , provided that the UTRAN cell has been already identified by the UE.

This requirement is applicable for UTRA FDD target cell configurations where the information required to make the SI report can be determined from the MIB and SIB3 alone, and MIB and SIB3 are not segmented into multiple TTIs. Additionally, for the requirement to be applicable, the reception conditions shall be such that the system frame number of the target UTRA FDD cell, the MIB and SIB3 can each be successfully decoded in no more than four attempts.

According to the reception conditions:

A cell shall be considered identifiable following conditions are fulfilled:

- CPICH Ec/Io $\geq$ -20 dB,

- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.The system frame number, the MIB and SIB3 of the target cell shall be considered decodable provided the BCH demodulation requirements are met according to [29].

The requirement for identifying a new CGI of an UTRA FDD cell within $T_{identify_CGI,\ UTRAN\ FDD}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or PRACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.1.2.4.17.1 provided the following condition is met:

- all MIB/SIB3/SCH specified in Section 8.1.2.4.17.1 are available for CGI reading at the UE in the measured cell.

Otherwise the time to acquire the new CGI of the UTRA FDD cell may be extended.

#### 8.1.2.4.17.2 CGI Reporting Delay

The CGI reporting delay occurs due to the delay uncertainty when inserting the CGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. In case DRX is used, the CGI reporting may be delayed until the next DRX cycle. In case eDRX is used, the CGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.4.18 E-UTRAN TDD-UTRAN FDD measurements with autonomous gaps

The requirements in this clause apply only to UE supporting E-UTRA TDD and UTRA FDD.

#### 8.1.2.4.18.1 Identification of a new CGI of UTRA FDD cell with autonomous gaps

The requirements in clause 8.1.2.4.17.1 also apply for this section.

#### 8.1.2.4.18.2 CGI Reporting Delay

The requirements in clause 8.1.2.4.17.2 also apply for this section.

### 8.1.2.4.19 E-UTRAN FDD – WLAN measurements

#### 8.1.2.4.19.1 Introduction

The requirements in this section shall apply for a UE capable of E-UTRA FDD and LTE-WLAN Aggregation [2].

#### 8.1.2.4.19.2 Requirements

##### 8.1.2.4.19.2.1 E-UTRAN FDD – WLAN measurements when no DRX is used

In the RRC_CONNECTED state when no DRX is used the measurement period for WLAN RSSI shall be $T_{WLAN_RSSI}$ as defined in table 8.1.2.4.19.2.1-1.

The value of $T_{WLAN_RSSI}$ depends upon whether the WLAN RSSI measurement is performed on the serving access point (AP) or on a neighbour AP and in case of the neighbour AP whether the neighbour AP is known or unknown to the UE:

- Measurement of known single neighbor AP is time-sensitive and is performed on the AP for which information about the operating channel is known to the UE; and

- - Measurement of unknown neighbor AP is not time-sensitive and is performed on the AP for which information about the operating channel is not known to the UE.

The UE shall be capable of performing WLAN RSSI measurements for certain minimum number of APs during $T_{WLAN_RSSI}$ as defined in table 8.1.2.4.19.2.1-1 provided that the beacon frame of the measured AP is available at the UE at least once every 102.4 ms. The UE physical layer shall be capable of reporting WLAN RSSI measurements to higher layers with the measurement period of $T_{WLAN_RSSI}$.

**Table 8.1.2.4.19.2.1-1: WLAN RSSI measurement period**

| WLAN RSSI measurement configuration | $T_{WLAN_RSSI}$ [seconds] |
|---|---|

| Type of Measurement | Minimum number of APs measured during $T_{WLAN_RSSI}$ | |
|---|---|---|
| Measurement of serving AP | 1 | 0.5 |
| Measurement of known neighbor AP on a single channel | 1 | 5 |
| Measurement of multiple unknown neighbor APs | 3 | 30 |

The WLAN RSSI measurement accuracy for all measured access points shall be fulfilled according to the accuracy as specified in the sub-clause 9.7.1.

#### 8.1.2.4.19.2.2 E-UTRAN FDD – WLAN measurements when DRX is used

In the RRC_CONNECTED state when DRX is used the measurement period for WLAN RSSI shall be $T_{RSSI_DRX}$ as defined in table 8.1.2.4.19.2.2-1.

The value of $T_{WLAN_RSSI_DRX}$ depends upon whether the WLAN RSSI measurement is performed on the serving access point (AP) or on a neighbour AP and in case of the neighbour AP whether the neighbour AP is known or unknown to the UE:

- Measurement of known single neighbor AP is time-sensitive and is performed on the AP for which information about the operating channel is known to the UE; and
- Measurement of unknown neighbor AP is not time-sensitive and is performed on the AP for which information about the operating channel is not known to the UE

The UE shall be capable of performing WLAN RSSI measurements for certain minimum number of APs during $T_{WLAN_RSSI_DRX}$ as defined in table 8.1.2.4.19.2.2-1 provided that the beacon frame of the measured AP is available at the UE at least once every 102.4 ms. The UE physical layer shall be capable of reporting WLAN RSSI measurements to higher layers with the measurement period of $T_{WLAN_RSSI_DRX}$.

**Table 8.1.2.4.19.2.2-1: Requirement to measure WLAN RSSI in DRX**

| WLAN RSSI measurement configuration | | DRX cycle length (s) | $T_{WLAN_RSSI_DRX}$ (s) |
|---|---|---|---|
| Type of Measurement | Minimum number of APs measured during $T_{WLAN_RSSI}$ | | |
| Measurement of serving AP | 1 | 0.002 ≤ DRX-cycle ≤ 0.320 | MAX (0.5, 5*$L_{DRX}$) |
| Measurement of one known neighbor AP on a single channel | 1 | 0.002 ≤ DRX-cycle ≤ 0.320 | MAX (5, 25*$L_{DRX}$) |
| | | 0.320 < DRX-cycle ≤ 2.56 | MAX (5, 20*$L_{DRX}$) |
| Measurement of 3 unknown neighbor APs | 3 | 0.002 ≤ DRX-cycle ≤ 0.320 | MAX (30, 150*$L_{DRX}$) |
| | | 0.320 < DRX-cycle ≤ 2.56 | MAX (30, 120*$L_{DRX}$) |
| Note 1: $L_{DRX}$ is the length of DRX cycle in second(s) | | | |

The WLAN RSSI measurement accuracy for all measured access points shall be fulfilled according to the accuracy as specified in the sub-clause 9.7.1.

#### 8.1.2.4.19.2.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.7.1.

#### 8.1.2.4.19.2.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.7.1.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or

subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{WLAN_RSSI}$ when no DRX is used as defined in section 8.1.2.4.19.2.1 and $T_{WLAN_RSSI_DRX}$ when DRX is used as defined in section 8.1.2.4.19.2.2. When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching,an additional delay can be expected.

#### 8.1.2.4.19.2.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.7.1.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.19.2.3.

### 8.1.2.4.20 E-UTRAN TDD – WLAN measurements

The requirements in this section shall apply for a UE capable of E-UTRA TDD and LTE-WLAN Aggregation [2].

The requirements in clause 8.1.2.4.19 also apply for this section.

### 8.1.2.4.21 E-UTRAN FDD – NR measurements

Requirements in this clause shall apply for NR capable UE when not configured with EN-DC.

The UE shall be able to identify new inter-RAT E-UTRAN FDD - NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

#### 8.1.2.4.21.1 E-UTRAN FDD – NR measurements

##### 8.1.2.4.21.1.1 Identification of a new NR cell

When measurement gaps are scheduled, the UE shall be able to identify a new detectable cell within $T_{identify_irat_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise, UE shall be able to identify a new detectable inter-RAT cell within $T_{identify_irat_with_index}$. The UE shall be able to identify a new detectable inter-RAT SS block of an already detected cell within $T_{identify_irat_without_index}$.

$$T_{identify_irat_without_index} = (T_{PSS/SSS_sync_irat} + T_{SSB_measurement_period_irat}) \text{ ms}$$

$$T_{identify_irat_with_index} = (T_{PSS/SSS_sync_irat} + T_{SSB_measurement_period_irat} + T_{SSB_time_index_irat}) \text{ ms}$$

Where:

$T_{PSS/SSS_sync_irat}$: it is the time period used in PSS/SSS detection given in table 8.1.2.4.21.1.1-1, 8.1.2.4.21.1.1-1A and table 8.1.2.4.21.1.1-2.

$T_{SSB_time_index_irat}$: it is the time period used to acquire the index of the SSB being measured given in table 8.1.2.4.21.1.1-3, 8.1.2.4.21.1.1-3A and table 8.1.2.4.21.1.1-4.

$T_{SSB_measurement_period_irat}$: equal to a measurement period of SSB based measurement given in table 8.1.2.4.21.1.1-5, 8.1.2.4.21.1.1-5A and table 8.1.2.4.21.1.1-6.

$M_{pss/sss_sync_irat}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_irat}$ = 64 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{pss/sss_sync_irat}$ = 40 samples. For a UE supporting FR2 power class 3 (handheld), $M_{pss/sss_sync_irat}$ = 40 samples. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_irat}$ = 40 samples.

$M_{SSB_index_irat}$: For a UE supporting FR2 power class 1, $M_{SSB_index_irat}$ = 40 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{SSB_index_irat}$ = 24 samples. For a UE supporting FR2 power class 3 (handheld), $M_{SSB_index_irat}$ = 24 samples. For a UE supporting FR2 power class 4, $M_{SSB_index_irat}$ = 24 samples.

$M_{meas_period_irat}$: For a UE supporting FR2 power class 1, $M_{meas_period_irat}$ = 64 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{meas_period_irat}$ = 40 samples. For a UE supporting FR2 power class 3 (handheld), $M_{meas_period_irat}$ = 40 samples. For a UE supporting FR2 power class 4, $M_{meas_period_irat}$ = 40 samples.

$N_{freq}$ is defined in clause 8.1.2.1.1

For per-FR measurement gap capable UE as specified in 38.306 [49], when FR2 NR measurement object(s) is configured,

- UE can perform such measurements without gap, and
- UE fulfils the requirements for FR2 measurement objects based on effective MGRP = 20 ms.

**Table 8.1.2.4.21.1.1-1: Time period for PSS/SSS detection (Frequency range FR1)**

| Condition NOTE1,2 | $T_{PSS/SSS_sync_irat}$ |
|---|---|
| No DRX | Max(600ms, 8 × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(600ms, Ceil(8×1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | 8 × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

**Table 8.1.2.4.21.1.1-1A: Time period for PSS/SSS detection for UE configured with *highSpeedInterRAT-r16* (Frequency range FR1)**

| Condition NOTE1,2 | $T_{PSS/SSS_sync_irat}$ |
|---|---|
| No DRX | Max(600ms, 8 × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle < 320ms | Max(600ms, ceil( 8 × M) × max(MGRP, SMTC period, DRX cycle)) ×$N_{freq}$ |
| DRX cycle ≥ 320ms | 8× DRX cycle ×$N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5.<br>NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms | |

**Table 8.1.2.4.21.1.1-2: Time period for PSS/SSS detection (Frequency range FR2)**

| Condition NOTE1,2 | $T_{PSS/SSS_sync_irat}$ |
|---|---|
| No DRX | Max(600ms, $M_{pss/sss_sync_irat}$ × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(600ms, (1.5 × $M_{pss/sss_sync_irat}$) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | $M_{pss/sss_sync_irat}$ × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

**Table 8.1.2.4.21.1.1-3: Time period for time index detection (Frequency range FR1)**

| Condition NOTE1,2 | $T_{SSB_time_index_irat}$ |
|---|---|
| No DRX | Max(120ms, 3 × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(120ms, Ceil(3 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | 3 × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

**Table 8.1.2.4.21.1.1-3A: Time period for time index detection for UE configured with *highSpeedInterRAT-r16* (Frequency range FR1)**

| Condition NOTE1,2 | $T_{SSB_time_index_irat}$ |
|---|---|
| No DRX | Max(120ms, 3 × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle < 320ms | Max(120ms, Ceil(3 × M) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle ≥ 320ms | 3 × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5.<br>NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms | |

**Table 8.1.2.4.21.1.1-4: Time period for time index detection (Frequency range FR2)**

| Condition NOTE1,2 | $T_{SSB_time_index_irat}$ |
|---|---|
| No DRX | Max(200ms, $M_{SSB_index_irat}$ × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(200ms, (1.5 × $M_{SSB_index_irat}$) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | $M_{SSB_index_irat}$ × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

In the requirements, an NR cell is considered detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in Section 9.11.1 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50],
- NR SS-RSRQ related conditions in the accuracy requirements in Section 9.11.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50],
- NR SS-SINR related conditions in the accuracy requirements in Section 9.11.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50].

When measurement gaps are scheduled for NR measurements the UE physical layer shall be capable of reporting NR SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in clause 9.11, with measurement period as shown in table 8.1.2.4.21.1.1-5, 8.1.2.4.21.1.1-5A and 8.1.2.4.21.1.1-6:

**Table 8.1.2.4.21.1.1-5: Measurement period for inter-RAT measurements (Frequency range FR1)**

| Condition NOTE1,2 | $T_{SSB_measurement_period_irat}$ |
|---|---|
| No DRX | Max(200ms, 8 × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(8 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | 8 × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

**Table 8.1.2.4.21.1.1-5A: Measurement period for inter-RAT measurements for UE configured with *highSpeedInterRAT-r16* (Frequency range FR1)**

| Condition NOTE1,2 | $T_{SSB_measurement_period_irat}$ |
|---|---|
| No DRX | Max(200ms, 8 × Max(MGRP, SMTC period) ) × $N_{freq}$ |
| DRX cycle < 320ms | Max(200ms, ceil(8 × M) x max(MGRP, SMTC period, DRX cycle))×$N_{freq}$ |
| DRX cycle ≥ 320ms | 4× M × DRX cycle ×$N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5.<br>NOTE 3: M = 1 when SMTC < = 40ms, and M = 1.5 when SMTC > 40ms | |

**Table 8.1.2.4.21.1.1-6: Measurement period for inter-RAT measurements (Frequency range FR2)**

| Condition NOTE1,2 | $T_{SSB_measurement_period_irat}$ |
|---|---|
| No DRX | Max(400ms, $M_{meas_period_irat}$ × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(400ms, (1.5 × $M_{meas_period_irat}$) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | $M_{meas_period_irat}$ × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |

The UE shall be capable of performing NR SS-RSRP, SS-RSRQ and SS-SINR for up to 7 NR carrier frequencies.

For each RAT E-UTRAN FDD-NR layer on FR1 or FR2, the UE shall be capable of monitoring at least 4 cells.

For each RAT E-UTRAN FDD-NR layer on FR1, during each layer 1 measurement period, the UE shall be capable of monitoring at least 7 SSBs with different SSB index and/or PCI on the RAT E-UTRAN FDD-NR layer.

For each RAT E-UTRAN FDD-NR layer on FR2, during each layer 1 measurement period, the UE shall be capable of monitoring at least 10 SSBs with different SSB index and/or PCI on the RAT E-UTRAN FDD-NR layer. The UE shall be capable of monitoring at least one SSB per cell.

The NR SS-RSRP measurement accuracy for all measured NR cells shall be as specified in clause 9.11.1. The NR SS-RSRQ measurement accuracy for all measured NR cells shall be as specified in clause 9.11.2. The NR SS-SINR measurement accuracy for all measured NR cells shall be as specified in clause 9.11.3.

NOTE: When inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, gap pattern 0 is assumed and requirements in this clause are derived assuming MGRP=80ms is used.

#### 8.1.2.4.21.1.2 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.21.1.3 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_irat_without_index}$ or $T_{identify_irat_with_index}$ defined in Clause 8.1.2.4.21.1.1 for the minimum requirements. When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If an NR cell which has been detectable at least for the time period $T_{identify_irat_without_index}$. or $T_{identify_irat_with_index}$ defined in clause 8.1.2.4.21.1.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_irat}$ defined in clause 8.1.2.4.21.1.1 provided the timing to that cell has not changed more than ±3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.21.1.4 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.21.1.3.

#### 8.1.2.4.21.2 Void

### 8.1.2.4.21A E-UTRAN FDD – NR measurements when CCA is used

Requirements in this clause shall apply for NR capable UE, when NR is in carrier frequencies with CCA and not configured with EN-DC.

The UE shall be able to identify new RAT E-UTRAN FDD-NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

In the requirements of clause 8.1.2.4.21A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the *N* candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period, where:

- For the cell detection procedure: *N* is at least one candidate SSB position (NOTE: the one candidate SSB position for the cell detection shall not be impacted by the set of candidate SSB positions which are already being measured by the UE within the current measurement period of the on-going measurements), and

- For other procedures in clause 8.1.2.4.21A: *N* are the first two successive candidate SSB positions when two or more candidate SSB positions are configured for this SSB index in one discovery burst transmission window, otherwise N is one candidate SSB position;

otherwise the SMTC occasion is considered as available at the UE.

### 8.1.2.4.21A.1 E-UTRAN FDD – NR measurements

#### 8.1.2.4.21A.1.1 Identification of a new NR cell

When measurement gaps are scheduled, the UE shall be able to identify a new detectable cell within $T_{identify_irat_cca_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise, UE shall be able to identify a new detectable inter-RAT frequency cell within $T_{identify_irat_cca_with_index}$. The UE shall be able to identify a new detectable inter-RAT frequency SSB of an already detected cell within $T_{identify_irat_cca_without_index}$.

$$T_{identify_irat_cca_without_index} = (T_{PSS/SSS_sync_irat_cca} + T_{SSB_measurement_period_irat_cca}) \text{ ms}$$

$$T_{identify_irat_cca_with_index} = (T_{PSS/SSS_sync_irat_cca} + T_{SSB_measurement_period_irat_cca} + T_{SSB_time_index_irat_cca}) \text{ ms}$$

Where:

$T_{PSS/SSS_sync_irat_cca}$: it is the time period used in PSS/SSS detection given in table 8.1.2.4.21A.1.1-1.

$T_{SSB_time_index_irat_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 8.1.2.4.21A.1.1-2.

$T_{SSB_measurement_period_irat_cca}$: equal to a measurement period of SSB based measurement given in table 8.1.2.4.21A.1.1-3.

$N_{freq}$ is defined in clause 8.1.2.1.1.

**Table 8.1.2.4.21A.1.1-1: Time period for PSS/SSS detection, in NR carrier frequencies with CCA**

| Condition NOTE1,2,3,4 | $T_{PSS/SSS_sync_irat_cca}$ |
|---|---|
| No DRX | Max(600ms, (8 +$L_{PSS/SSS,gaps}$) × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(600ms, Ceil((8+$L_{PSS/SSS,gaps}$) ×1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | (8+$L_{PSS/SSS,gaps}$) × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5. | |
| NOTE 3: $L_{PSS/SSS,gaps}$ is the number of SMTC occasions not available at the UE during $T_{PSS/SSS_sync_irat_cca}$, where $L_{PSS/SSS,gaps} \le L_{PSS/SSS,gaps,max}$. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. | |
| NOTE 4: $L_{PSS/SSS,gaps}$ = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms $L_{PSS/SSS,gaps}$ = 8 for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{PSS/SSS,gaps}$ = 5 for DRX cycle > 320 ms. | |

Upon exceeding $L_{PSS/SSS,gaps,max}$, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

**Table 8.1.2.4.21A.1.1-2: Time period for time index detection, in NR carrier frequencies with CCA**

| Condition NOTE1,2,3,4 | $T_{SSB_time_index_irat_cca}$ |
|---|---|
| No DRX | Max(120ms, (3 + $L_{ind,gaps}$) × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(120ms, ceil((3+ $L_{ind,gaps}$) x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | (3+ $L_{ind,gaps}$) × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5<br>NOTE 3: $L_{ind,gaps}$ is the number of SMTC occasions not available at the UE during $T_{SSB_time_index_irat_cca}$, where $L_{ind,gaps} \le L_{ind,gaps,max}$. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.<br>NOTE 4: $L_{ind,gaps,max}$ = 5 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, $L_{ind,gaps,max}$ = 3 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{ind,gaps,max}$ = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding $L_{ind,gaps,max}$. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

In the requirements, an NR cell is considered to be detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in Section 9.11.4 are fulfilled for a corresponding Band, together with the corresponding side conditions in subclause 10.1.37.1 of TS 38.133 [50],

- NR SS-RSRQ related conditions in the accuracy requirements in Section 9.11.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in subclause 10.1.30.1 of TS 38.133 [50],

- NR SS-SINR related conditions in the accuracy requirements in Section 9.11.6 are fulfilled for a corresponding Band, together with the corresponding side conditions in subclause 10.1.32.1 of TS 38.133 [50].

When measurement gaps are scheduled for NR measurements the UE physical layer shall be capable of reporting NR SS-RSRP, SS-RSRQ, and SS-SINR measurements to higher layers with measurement accuracy as specified in clause 10.1.37.1 of TS 38.133[50], 10.1.30.1 of TS 38.133[50] and 10.1.32.1 of TS 38.133[50], respectively, with measurement period as shown in table 8.1.2.4.21A.1.1-3:

**Table 8.1.2.4.21A.1.1-3: Measurement period for inter-RAT measurements**

| Condition NOTE1,2,3,4 | $T_{SSB_measurement_period_irat_cca}$ |
|---|---|
| No DRX | Max(200ms, (8+ $L_{meas}$) × Max(MGRP, SMTC period)) × $N_{freq}$ |
| DRX cycle ≤ 320ms | Max(200ms, ceil((8+ $L_{meas}$) x 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $N_{freq}$ |
| DRX cycle > 320ms | (8+ $L_{meas}$) × DRX cycle × $N_{freq}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 5<br>NOTE 3: $L_{meas}$ is the number of SMTC occasions not available at the UE during $T_{SSB_measurement_period_irat_cca}$, where $L_{meas} \le L_{meas,max}$. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.<br>NOTE 4: $L_{meas,max}$ = 12 for Max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, $L_{meas,max}$ = 8 for Max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{meas,max}$ = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding $L_{meas,max}$. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

The UE shall be capable of performing SSB based SS-RSRP, SS-RSRQ, and SS-SINR for up to [7] NR carrier frequencies.

For each RAT E-UTRAN FDD-NR layer on, in carrier frequencies with CCA, the UE shall be capable of monitoring at least 4 cells.

For each RAT E-UTRAN FDD-NR layer in carrier frequencies with CCA, during each layer 1 measurement period, the UE shall be capable of monitoring at least 7 SSBs with different SSB indexes and/or PCI on the RAT E-UTRAN FDD-NR layer.

The NR SS-RSRP measurement accuracy for all measured cells shall be as specified in clause 10.1.37.1 of TS 38.133[50]. The NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.1.30.1 of TS 38.133[50]. The NR SS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.1.32.1 of TS 38.133[50].

#### 8.1.2.4.21A.1.2 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.1.2.4.21A.1.3 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_irat_cca_without_index}$ or $T_{identify_irat_cca_with_index}$ defined in Clause 8.1.2.4.21A.1.1 for the minimum requirements. When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_irat_cca_without_index}$ or $T_{identify_irat_cca_with_index}$ defined in clause 8.1.2.4.21A.1.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_NR_cca_FDD}$ defined in clause 8.1.2.4.21A.1.1 provided the timing to that cell has not changed more than ±3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.1.2.4.21A.1.4 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.4.21A.1.3.

#### 8.1.2.4.21A.1.5 NR inter-RAT RSSI measurements

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [58], on one or more inter-RAT carriers operating with CCA, TS 37.213 [57], if the carrier(s) are indicated by higher layers [38], and reporting the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [38] occurring with a configured RSSI measurement timing configuration periodicity, *rmtc-Periodicity*, according to [38].

**Table 8.1.2.4.21A.1.5-1: Measurement period for inter-RAT RSSI measurements with gaps**

| Condition NOTE1,2,3,4 | $T_{RSSI_measurement_period_NR_cca}$ |
|---|---|
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x $CSSF_{NR,EN-DC}$) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x $CSSF_{NR,EN-DC}$) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section 10.1.34.1 in TS 38.133 [50].

#### 8.1.2.4.21A.1.6 NR inter-RAT channel occupancy measurements

The UE shall be capable of estimating the channel occupancy on one or more carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer.

**Table 8.1.2.4.21A.1.6-1: Measurement period for inter-RAT Channel Occupancy measurements with gaps**

| Condition NOTE1,2,3,4 | $T_{CO_measurement_period_NR_cca}$ |
|---|---|
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x $CSSF_{NR,EN-DC}$) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x $CSSF_{NR,EN-DC}$) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency channel occupancy measurements.

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section 10.1.35.2 of TS 38.133 [50].

### 8.1.2.4.22 E-UTRAN TDD – NR measurements

Requirements in this clause shall apply for NR capable UE when not configured with EN-DC.

The requirements in clause 8.1.2.4.21 also apply for this section.

### 8.1.2.4.22A E-UTRAN TDD – NR measurements when CCA is used

Requirements in this clause shall apply for NR capable UE when not configured with EN-DC, considering NR carrier frequencies with CCA.

The requirements in clause 8.1.2.4.21A also apply for this section.

### 8.1.2.4.23 Void

### 8.1.2.4.24 Void

### 8.1.2.4.25 E-UTRAN FDD – NR SFTD Measurements

#### 8.1.2.4.25.1 Introduction

This clause contains requirements for a UE supporting E-UTRAN FDD – NR dual connectivity and is applicable in RRC_CONNECTED state and conditioned on that no NR PSCell is configured. The UE shall perform inter-RAT SFTD measurement and report SFTD result with/without SS-RSRP after the network requests with *reportSFTD-Meas* set to neighbour cells. The overall delay includes RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2] and SFTD measurement reporting delay in clause 8.1.2.4.25.3.

#### 8.1.2.4.25.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this section are applicable under the side condition SCH Ês/Iot ≥ -3 dB for the NR cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest NR cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more NR cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the NR cell regardless of its SSB position in the SMTC period. The SFTD measurement shall be conducted with sustained connection to the E-UTRA PCell and activated SCell(s), however, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 7.35.

When measurement gaps are provided, the UE shall be capable of finding the NR cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no MCG DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure_SFTD1}$ as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
  - For NR carrier in FR1: $T_{measure_SFTD1}$ = 14 SMTC periods
  - For NR carrier in FR2: $T_{measure_SFTD1}$ = 112 SMTC periods
- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:
  - For NR carrier in FR1: $T_{measure_SFTD1} = N_{freq} \times 8 \times$ Max(MGRP, SMTC period)
  - For NR carrier in FR2: $T_{measure_SFTD1} = N_{freq} \times 64 \times$ Max(MGRP, SMTC period)
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
  - For NR carrier in FR1: $T_{measure_SFTD1}$ = 19 SMTC periods
  - For NR carrier in FR2: $T_{measure_SFTD1}$ = 152 SMTC periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
  - For NR carrier in FR1: $T_{measure_SFTD1} = N_{freq} \times 13 \times$ Max(MGRP, SMTC period)
  - For NR carrier in FR2: $T_{measure_SFTD1} = N_{freq} \times 104 \times$ Max(MGRP, SMTC period)

where $N_{freq}$ is the number of carriers monitored in measurement gaps.

When MCG DRX is used, the same $T_{measure_SFTD1}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case an NR PSCell is added, the UE shall terminate the inter-RAT SFTD measurement.

In case PCell is changed due to handover, the UE shall terminate the inter-RAT SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfill the requirement in clause 9.1.27. The measurement accuracy for additionally reported NR SS-RSRP shall fulfil the requirement in clause 9.11.1.

#### 8.1.2.4.25.2a SFTD Measurement delay with CCA on target frequency

The requirements on SFTD measurement delay defined in this section are applicable to a UE configured with a target NR carrier for which CCA is used and under the side condition SCH Ês/Iot ≥ -3 dB for the NR cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps.

In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest NR cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more NR cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the NR cell regardless of its SSB position in the SMTC period. The SFTD measurement shall be conducted with sustained connection to the E-UTRA PCell and activated SCell(s), however, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 7.35.

When measurement gaps are provided, the UE shall be capable of finding the NR cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no MCG DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure_SFTD_LBT_max} = 4 \times T_{measure_SFTD1}$, where $T_{measure_SFTD1}$ is defined in clause 8.1.2.4.25.2. If the UE is unable to meet the requirement, it shall terminate the inter-RAT SFTD measurement.

When MCG DRX is used, the same $T_{measure_SFTD_LBT_max}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case an NR PSCell is added, the UE shall terminate the inter-RAT SFTD measurement.

In case PCell is changed due to handover, the UE shall terminate the inter-RAT SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfill the requirement in clause 9.1.28. The measurement accuracy for additionally reported NR SS-RSRP shall fulfil the requirement in clause 9.11.1.

#### 8.1.2.4.25.3 SFTD Measurement reporting delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report. When the UE is configured to perform SRS carrier-based switching, an additional delay can be expected.

The SFTD measurement reporting delay shall be less than $T_{measure_SFTD1}$ defined in clause 8.1.2.4.25.2 and $T_{measure_SFTD_LBT_max}$ defined in clause 8.1.2.4.25.2a for target carrier without and with CCA, respectively.

### 8.1.2.4.26 E-UTRAN TDD – NR SFTD Measurements

#### 8.1.2.4.26.1 Introduction

This clause contains requirements for a UE supporting E-UTRAN TDD – NR dual connectivity and is applicable in RRC_CONNECTED state and conditioned on that no NR PSCell is configured.

When no measurement gap is provided, the UE is not required to perform SFTD measurement during the UL subframes of an E-UTRAN serving cell which is on the same TDD band with the NR target cell.

When no measurement gap is provided, the UE is not required to perform SFTD measurement during the UL subframes of a TDD E-UTRAN serving cell which is on the different band with the NR target cell when UE doesn't support *simultaneousRxTxInterBandENDC* in this band combination.

The requirements in clause 8.1.2.4.25 also apply for this section.

### 8.1.2.4.27 E-UTRA FDD - NR measurements with autonomous gaps

#### 8.1.2.4.27.1 Introduction

The requirements in this clause are specified for CGI identification of an NR target cell and are applicable for a UE:

- in RRC_CONNECTED state, and
- configured with LTE-FDD standalone

The overall CGI reporting delay is defined in Clause 8.1.2.4.27.3.

#### 8.1.2.4.27.2 CGI identification of an NR cell with autonomous gaps

The UE shall identify and report the CGI of a known NR target cell when requested by the network for the purpose of 'reportCGI'. Only one cell is provided to the UE with *cellForWhichToReportCGI* for identifying the CGI. The UE may make autonomous gaps in both downlink reception and uplink transmission of both E-UTRA and NR serving cell(s) for receiving MIB and SIB1 message according to clause 5.5.3 of TS 38.331 [38]. Note that E-UTRAN does not configure si-RequestForHO if *reportConfig* is linked to a *measObject* set to *measObjectNR*. The UE shall be able to identify a new CGI of a known NR cell within:

$$T_{identify_CGI_NR} = ( T_{MIB_NR} + T_{SIB1_NR}) \text{ ms}$$

Where:

$T_{MIB_NR}$ is the maximum time to acquire MIB message. $T_{MIB_NR} = 6 * T_{SMTC}$ ms for NR cells on FR1 or $25 * T_{SMTC}$ ms, for NR cells on FR2.

$T_{SIB1_NR}$ is the maximuim time period to acquire SIB1 message. $T_{SIB1_NR} = 6 * T_{RMSI\text{-}scheduling}$ ms, where $T_{RMSI\text{-}scheduling}$ is the periodicity with which the SIB1 is actually transmitted by the NR target cell.

The requirement for identifying the CGI of an NR cell within $T_{identify_CGI_NR}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in [2] is used.

Within the time $T_{identify_CGI_NR}$, over which the UE identifies the CGI of an NR cell, the UE shall fulfil interruption requirements specified in

Clause 7.37.

In the requirement a cell is known if,

- During the last 5 seconds for FR1 or 3 seconds for FR2 before the reception of the report CGI command:
  - The UE has sent a valid L3-RSRP measurement report with SSB index for the NR target cell and
- During MIB decoding at least reported SSBs remains detectable according to the SSB Es/Iot conditions specified in clause 9.2 or 9.3 of TS 38.133 [50], and
- During SIB1 decoding the SSB used for MIB decoding remains detectable according to the SSB Es/Iot conditions specified in clause 9.2 or 9.3 of TS 38.133 [50], and
- During MIB decoding, the SSB for MIB decoding remains detectable with SNR $\geqslant$ -3dB
- During SIB1 decoding, the PDSCH for SIB1 decoding remains detectable with SNR $\geqslant$ -3dB

#### 8.1.2.4.27.3 CGI reporting delay

The CGI reporting delay is defined as the time between a command that will trigger a CGI report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of 2 x $TTI_{DCCH}$ resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The CGI reporting delay shall be less than $T_{identify_CGI_NR}$ defined in clause 8.1.2.4. 27.2 plus RRC procedure delay defined in clause 11 in TS 36.331 [2], an additional 30ms margin, and additional 20ms margin if NR target cell is on FR2.

### 8.1.2.4.28 E-UTRA TDD - NR measurements with autonomous gaps

#### 8.1.2.4.28.1 Introduction

The requirements in this clause are specified for CGI identification of an NR target cell and are applicable for a UE:

- in RRC_CONNECTED state, and
- configured with LTE-TDD standalone

The overall CGI reporting delay is defined in Clause 8.1.2.4.28.3.

#### 8.1.2.4.28.2 CGI identification of an NR cell with autonomous gaps

The requirements in clause 8.1.2.4. 27.2 shall apply.

#### 8.1.2.4.28.3 CGI reporting delay

The requirements in clause 8.1.2.4. 27.3 shall apply.

### 8.1.2.5 E-UTRAN OTDOA Intra-Frequency RSTD Measurements

All intra-frequency RSTD measurement requirements specified in Sections 8.1.2.5.1 and 8.1.2.5.2 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

When using CRS, in addition to PRS, is enabled in the OTDOA assistance data, it is up to UE implementation whether to use or not the CRS for RSTD measurements, but in either case the RSTD measurements reported by the UE shall meet the requirements specified in this section.

If network-based CRS interference mitigation is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting network-based CRS interference mitigation shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.1.2.5.1 E-UTRAN FDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{\text{RSTDIntraFreqFDD,E-UTRAN}}$ ms as given below (see also Figure 8.1.2.5.1-1):

$$T_{\text{RSTDIntraFreqFDD,E-UTRAN}} = T_{\text{PRS}} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

$T_{\text{RSTDIntraFreqFDD,E-UTRAN}}$ is the total time for detecting and measuring at least $n$ cells,

$T_{\text{PRS}}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.5.1-1, where each PRS positioning occasion comprises of $N_{PRS}$ ($1 \le N_{PRS} \le 6$) consecutive downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time.

**Table 8.1.2.5.1-1: Number of PRS positioning occasions within $T_{\text{RSTDIntraFreqFDD,E-UTRAN}}$**

| Positioning subframe configuration period $T_{\text{PRS}}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1.<br>Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqFDD,E-UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.5 for a corresponding Band

$PRS\hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqFDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.1.2.5.1-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.1.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreqFDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,E-UTRAN,HO} = T_{RSTDIntraFreqFDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,E-UTRAN,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover; it can be up to 45 ms.

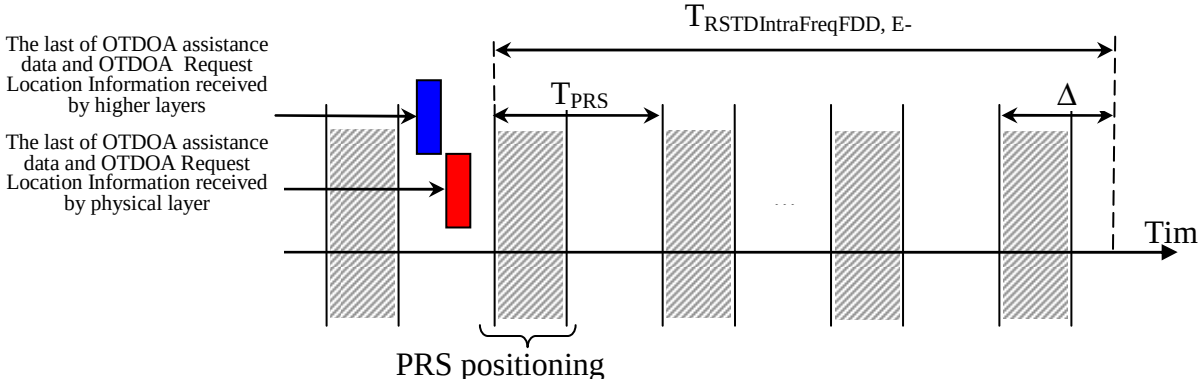


**Figure 8.1.2.5.1-1. Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.1.2.5.1.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.5.2 E-UTRAN TDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,E\text{-}UTRAN}$ ms as given below:

$$T_{RSTDIntraFreqTDD,E\text{-}UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

$T_{RSTDIntraFreqTDD,E\text{-}UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.5.2-1, where a PRS positioning occasion is as defined in Clause 8.1.2.5.1, and

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time.

**Table 8.1.2.5.2-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqTDD,E\text{-}UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving TDD carrier frequency f1.<br>Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving TDD carrier frequency f1 and one inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqTDD,E\text{-}UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

$PRP\ 1,2|_{dBm}$ according to Annex B.2.5 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDIntraFreq_TDD,E\text{-}UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.1.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreq_TDD,E\text{-}UTRAN_HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreq_TDD,E\text{-}UTRAN_HO} = T_{RSTDIntraFreq_TDD,E\text{-}UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreq_TDD,E\text{-}UTRAN_HO}$,

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover; it can be up to 45 ms.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.1.2.5.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.5.2-2.

**Table 8.1.2.5.2-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 1, 2, 3, 4 and 5 |
| 25, 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.1.2.5.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where TTIDCCH is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.5.3 E-UTRAN FDD Intra-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreq_FDD,E\text{-}UTRAN}$ ms as given below (see also Figure 8.1.2.5.3-1):

$$T_{RSTDIntraFreq_FDD,E\text{-}UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms,$$

where

$T_{RSTDIntraFreq_FDD,E\text{-}UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.5.3-1, where a PRS positioning occasion is as defined in Clause 8.1.2.5.1, and

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time.

**Table 8.1.2.5.3-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqFDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 64 |
| >160 ms | 16 | 32 |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqFDD,E-UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

$PRP_{1,2}|_{dBm}$ according to Annex B.2.5 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDIntraFreqFDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.1.2.5.3-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.5.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreqFDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,E-UTRAN,HO} = T_{RSTDIntraFreqFDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,E-UTRAN,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover; it can be up to 45 ms.

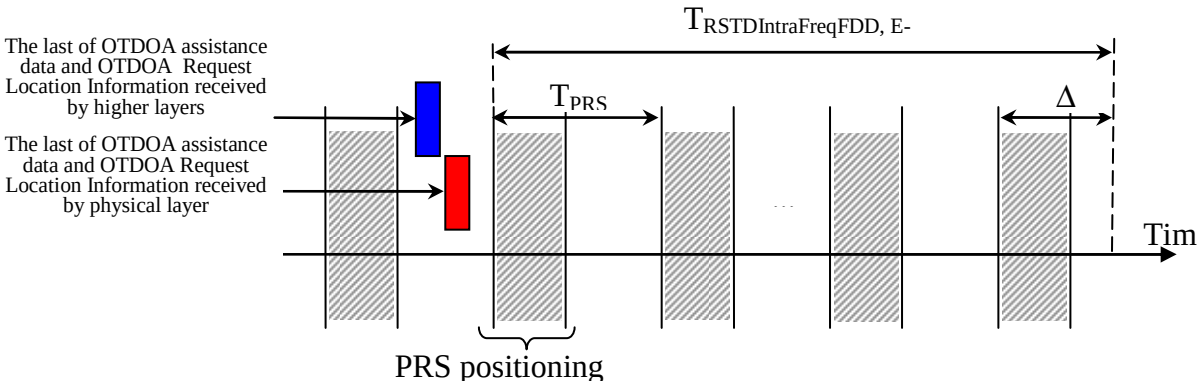


**Figure 8.1.2.5.3-1. Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.1.2.5.3.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.5.4 E-UTRAN TDD Intra-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,E-UTRAN}$ ms as given below:

$$T_{RSTDIntraFreqTDD,E-UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms,$$

where

$T_{RSTDIntraFreqTDD,E-UTRAN}$ is the total time for detecting and measuring at least $n$ cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.5.4-1, where a PRS positioning occasion is as defined in Clause 8.1.2.5.1, and

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time.

**Table 8.1.2.5.4-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqTDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 64 |

| | | |
|---|---|---|
| >160 ms | 16 | 32 |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving TDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving TDD carrier frequency f1 and one inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqTDD,E-UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

$PRP\ 1,2|_{dBm}$ according to Annex B.2.5 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDIntraFreqTDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.5.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreqTDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqTDD,E-UTRAN,HO} = T_{RSTDIntraFreqTDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqTDD,E-UTRAN,HO}$,

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover; it can be up to 45 ms.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.1.2.5.4) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.5.4-2.

**Table 8.1.2.5.4-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 1, 2, 3, 4 and 5 |
| 25, 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |

| Note: | Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. |
|---|---|

#### 8.1.2.5.4.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.5 Void

### 8.1.2.6.6 Void

### 8.1.2.6.7 Void

### 8.1.2.6.8 Void

## 8.1.2.6 E-UTRAN Inter-Frequency OTDOA Measurements

All inter-frequency RSTD measurement requirements specified in Sections 8.1.2.6.1-8.1.2.6.4 shall apply, provided that

- the UE is capable of inter-frequency RSTD measurements for OTDOA [24], and
- either the measurement gap pattern ID # 0 specified in Clause 8.1.2.1 is used or the UE supports capability of conducting inter-frequency measurements without gaps.

All inter-frequency RSTD measurement requirements specified in Sections 8.1.2.6.1-8.1.2.6.4 shall apply without DRX as well as for any DRX or eDRX_CONN cycles specified in TS 36.331 [2].

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.1.2.6 provided the following condition is met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.10 are available for RSTD measurements at the UE in the measured and reference cells.

The requirements in this section shall also appy, when the UE is configured to perform SRS carrier based switching and using measurement gaps.

When using CRS, in addition to PRS, is enabled in the OTDOA assistance data, it is up to UE implementation whether to use or not the CRS for RSTD measurements, but in either case the RSTD measurements reported by the UE shall meet the requirements specified in this section.

If network-based CRS interference mitigation is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting network-based CRS interference mitigation shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

### 8.1.2.6.1 E-UTRAN FDD-FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, within $k * T_{RSTDInterFreqFDD,E-UTRAN}$ ms as given below:

$$T_{RSTDInterFreqFDD,E-UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

$k$ = 2 if the UE is configured with inter-RAT measurement on one or more NR carriers, $k$ = 1 otherwise,

$T_{RSTDInterFreqFDD,E-UTRAN}$ is the total time for detecting and measuring at least $n$ cells,

$T_{PRS}$ is the the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.1-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2.<br>Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,E-UTRAN}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$\text{PRS}\hat{E}_s / \text{Iot}$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqFDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqFDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqFDD,E-UTRAN,HO} = T_{RSTDInterFreqFDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqFDD,E-UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.2.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

#### 8.1.2.6.1.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.2 E-UTRAN TDD-FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within *k* * $T_{RSTDInterFreqTDDFDD,E-UTRAN}$ ms as given below:

$$T_{RSTDInterFreqTDDFDD,E-UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms$$

,

where

*k* = 2 if the UE is configured with inter-RAT measurement on one or more NR carriers, *k* = 1 otherwise,

$T_{RSTDInterFreqTDDFDD,E-UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.2-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.2-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDDFDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |

NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2.

NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively.

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTD\,InterFeqTDD\,FDD,E\text{-}UTRAN}$, provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band,

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTD\,InterFeqTDD\,FDD,E\text{-}UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTD\,InterFreqTDD\,FDD,E\text{-}UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTD\,InterFreqTDD\,FDD,E\text{-}UTRAN,HO} = T_{RSTD\,InterFreqTDD\,FDD,E\text{-}UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTD\,InterFreqTDD\,FDD,E\text{-}UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.2.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

The inter-frequency requirements in this clause (8.1.2.6.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.2-2.

**Table 8.1.2.6.2-2: TDD uplink-downlink subframe configurations applicable for TDD-FDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 1, 2, 3, 4 and 5 |
| 25, 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |
| NOTE: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.1.2.6.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.3 E-UTRAN TDD-TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within *k* * $T_{RSTDInterFreqTDD,E-UTRAN}$ ms as given below:

$$T_{RSTDInterFreqTDD,E-UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

*k* = 2 if the UE is configured with inter-RAT measurement on one or more NR carriers, *k* = 1 otherwise,

$T_{RSTDInterFreqTDD,E-UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.1-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.3-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2.<br>Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The inter-frequency requirements in this clause (8.1.2.6.3) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.3-2.

**Table 8.1.2.6.3-2: TDD uplink-downlink subframe configurations applicable for inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 3, 4 and 5 |
| 25 | 1, 2, 3, 4, 5 and 6 |
| 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |

| | |
|---|---|
| Note 1: | Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. |
| Note2: | For UEs capable of performing inter-frequency measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 8.1.2.5.2-2 shall apply. |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,E-UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqTDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqTDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,E-UTRAN,HO} = T_{RSTDInterFreqTDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,E-UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.2.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

#### 8.1.2.6.3.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.4 E-UTRAN FDD-TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within *k* * $T_{RSTDInterFreqFDDTDD,E-UTRAN}$ ms as given below:

$$T_{RSTDInterFreqFDDTDD,E-UTRAN} = T_{PRS} \cdot (M-1) + \Delta \quad \text{ms} \quad ,$$

where

*k* = 2 if the UE is configured with inter-RAT measurement on one or more NR carriers, *k* = 1 otherwise,

$T_{RSTDInterFreqFDDTDD,E-UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.4-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.4-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDDTDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 | 32 |
| >160 ms | 8 | 16 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDDTDD,E-UTRAN}$, provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqFDDTDDE-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqFDDTDDE-UTRANHO}$) shall be according to the following expression:

$$T_{RSTDInterFreqFDDTDDE-UTRANHO} = T_{RSTDInterFreqFDDTDDE-UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqFDDTDDE-UTRANHO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.2.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

The inter-frequency requirements in this clause (8.1.2.6.4) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.4-2.

**Table 8.1.2.6.4-2: TDD uplink-downlink subframe configurations applicable for inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 3, 4 and 5 |
| 25 | 1, 2, 3, 4, 5 and 6 |
| 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |
| Note 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16].<br>Note2: For UEs capable of performing inter-frequency measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 8.1.2.5.2-2 shall apply. | |

#### 8.1.2.6.4.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.5 E-UTRAN FDD-FDD Inter-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within $T_{RSTDInterFreqFDD,E-UTRAN}$ ms as given below:

$$T_{RSTDInterFreqFDD,E-UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

$T_{RSTDInterFreqFDD,E-UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.5-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.5-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,E-UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 64 |
| >160 ms | 16 | 32 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,E-UTRAN}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$\text{PRS}\hat{E}_s / \text{Iot}$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqFDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqFDD,E-UTRANHO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,E\text{-}UTRAN,HO} = T_{RSTDInterFreqTDD,E\text{-}UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,E\text{-}UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.6.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

#### 8.1.2.6.5.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.6 E-UTRAN TDD-FDD Inter-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within $T_{RSTDInterFreqTDDFDD,E\text{-}UTRAN}$ ms as given below:

$$T_{RSTDInterFreqTDDFDD,E\text{-}UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms,$$

where

$T_{RSTDInterFreqTDDFDD,E\text{-}UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.6-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.6-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDDFDD,E\text{-}UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 64 |
| >160 ms | 16 | 32 |

| |
|---|
| NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. |
| NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFeqTDDFDD-UTRAN}$, provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band,

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFeqTDDFDD-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqTDDFDD-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDDFDD-UTRAN,HO} = T_{RSTDInterFreqTDDFDD-UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDDFDD-UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.6.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

The inter-frequency requirements in this clause (8.1.2.6.6) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.6-2.

**Table 8.1.2.6.6-2: TDD uplink-downlink subframe configurations applicable for TDD-FDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 1, 2, 3, 4 and 5 |
| 25, 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |

| NOTE: | Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. |
|---|---|

#### 8.1.2.6.6.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.7 E-UTRAN TDD-TDD Inter-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within $T_{RSTDInterFreqTDD,E\text{-}UTRAN}$ ms as given below:

$$T_{RSTDInterFreqTDD,E\text{-}UTRAN} = T_{PRS} \cdot (M - 1) + \Delta \quad ms \quad ,$$

where

$T_{RSTDInterFreqTDD,E\text{-}UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.7-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.7-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,E\text{-}UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 6] |
| >160 ms | 16 | 32 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The inter-frequency requirements in this clause (8.1.2.6.7) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.7-2.

**Table 8.1.2.6.7-2: TDD uplink-downlink subframe configurations applicable for inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 3, 4 and 5 |
| 25 | 1, 2, 3, 4, 5 and 6 |

| | |
|---|---|
| 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |
| Note 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |
| Note2: For UEs capable of performing inter-frequency measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 8.1.2.5.2-2 shall apply. | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,E-UTRAN}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$PRS\hat{E}_s / Iot$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqTDD,E-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDInterFreqTDD,E-UTRAN,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,E-UTRAN,HO} = T_{RSTDInterFreqTDD,E-UTRAN} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,E-UTRAN,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.6.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

#### 8.1.2.6.7.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.6.8 E-UTRAN FDD-TDD Inter-Frequency OTDOA Measurements for UE Category 1bis

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, within $T_{RSTDInterFeqFDDTDD_E\text{-}UTRAN}$ ms as given below:

$$T_{RSTDInterFeqFDDTDD_E\text{-}UTRAN} = T_{PRS} \cdot (M-1) + \Delta \quad \text{ms},$$

where

$T_{RSTDInterFeqFDDTDD_E\text{-}UTRAN}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [16], among the measured *n* cells including the reference cell,

$M$ is the number of PRS positioning occasions as defined in Table 8.1.2.6.8-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time, and

the *n* cells are distributed on up to two carrier frequencies including a serving carrier frequency and one inter-frequency carrier.

**Table 8.1.2.6.8-1: Number of PRS positioning occasions within $T_{RSTDInterFeqFDDTDD_E\text{-}UTRAN}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 32 | 64 |
| >160 ms | 16 | 32 |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFeqFDDTDD_E\text{-}UTRAN}$, provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.6 for a corresponding Band

$\text{PRS}\hat{E}_s / \text{Iot}$ is as defined in Clause 8.1.2.5.1.

The time $T_{RSTDInterFreqFDDTDDE-UTRAN}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed, and the inter-frequency carrier on which RSTD is measured becomes the new serving carrier frequency after the inter-frequency handover, the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqFDDTDDE-UTRANHO}$) shall be according to the following expression:

$$T_{RSTDInterFreqFDDTDDE-UTRANHO} = T_{RSTDInterFreqFDDTDDE-UTRAN} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqFDDTDDE-UTRANHO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover; it can be up to 45 ms.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.10.6.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCells on whose carriers RSTD measurement is performed during the RSTD measurement period.

The inter-frequency requirements in this clause (8.1.2.6.8) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.1.2.6.8-2.

**Table 8.1.2.6.8-2: TDD uplink-downlink subframe configurations applicable for inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, 15 | 3, 4 and 5 |
| 25 | 1, 2, 3, 4, 5 and 6 |
| 50, 75, 100 | 0, 1, 2, 3, 4, 5 and 6 |
| Note 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16].<br>Note 2: For UEs capable of performing inter-frequency measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 8.1.2.5.2-2 shall apply. | |

#### 8.1.2.6.8.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.1.2.7 E-UTRAN E-CID Measurements

#### 8.1.2.7.1 E-UTRAN FDD UE Rx-Tx Time Difference Measurements

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 200 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_FDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.1.2.7.1-1. When eDRX_CONN is used in RRC_CONNECTED state, the physical layer measurement period ($T_{measure_FDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.1.2.7.1-2.

**Table 8.1.2.7.1-1: FDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_FDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.1.2.7.1-2: FDD UE Rx-Tx time difference measurement requirement when eDRX_CONN is used**

| eDRX_CONN cycle length (s) | $T_{measure_FDD_UE_Rx_Tx1}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_FDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_FDD_UE_Rx_Tx3} = (K+1)*(T_{measure_FDD_UE_Rx_Tx1}) + K*T_{PCcell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_FDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover; it can be up to 45 ms.

If the UE supporting E-UTRA carrier aggregation when configured with the secondary component carrier(s) is performing UE Rx-Tx time difference measurement while the PCell is changed regardless whether the primary component carrier is changed or not then the UE shall restart the Rx-Tx measurement on the new PCell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements corresponding to the new PCell. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_FDD_UE_Rx_Tx2}$ as defined in the following expression:

$$T_{measure_FDD_UE_Rx_Tx2} = (N+1)*(T_{measure_FDD_UE_Rx_Tx1}) + N*T_{PCell_change_CA}$$

Where:

N is the number of times the PCell is changed over the measurement period ($T_{measure_FDD_UE_Rx_Tx2}$),

$T_{PCell_change_CA}$ is the time necessary to change the PCell; it can be up to 25 ms.

If IDC autonomous denial is configured then the UE shall also meet the requirements, provided not more than 30 IDC autonomous denial suframes are configured over an IDC autonomous denial validity period of at least 200 ms.

The UE capable of SRS carrier based switching, when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission over one or more SCells without PUSCH, shall perform UE Rx-Tx time difference measurement and meet the requirements defined in Section 8.1.2.7.1 provided the following condition is met:

- at least one downlink subframe and one uplink subframe per radio frame are available for doing UE Rx-Tx time difference measurement at the UE in the PCell.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX or eDRX_CONN is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.9.

#### 8.1.2.7.1.1 UE Rx-Tx Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other RRC or LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This

measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in sub-clause 9.1.9.

#### 8.1.2.7.2 E-UTRAN TDD UE Rx-Tx Time Difference Measurements

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 200 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_TDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.1.2.7.2-1. When eDRX_CONN is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_TDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.1.2.7.2-2.

**Table 8.1.2.7.2-1: TDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_TDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.1.2.7.2-2: TDD UE Rx-Tx time difference measurement requirement when eDRX_CONN is used**

| eDRX_CONN cycle length (s) | $T_{measure_TDD_UE_Rx_Tx1}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_TDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_TDD_UE_Rx_Tx3} = (K+1)*(T_{measure_TDD_UE_Rx_Tx1}) + K*T_{PCell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_TDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover; it can be up to 45 ms.

If the UE supporting E-UTRA carrier aggregation when configured with the secondary component carrier(s) is performing UE Rx-Tx time difference measurement while the PCell is changed regardless whether the primary component carrier is changed or not then the UE shall restart the Rx-Tx measurement on the new PCell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements corresponding to the new PCell. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_TDD_UE_Rx_Tx2}$ as defined in the following expression:

$$T_{measure_TDD_UE_Rx_Tx2} = (N+1)*(T_{measure_TDD_UE_Rx_Tx1}) + N*T_{PCell_change_CA}$$

Where:

N is the number of times the PCell is changed over the measurement period ($T_{measure_TDD_UE_Rx_Tx2}$),

$T_{PCell_change_CA}$ is the time necessary to change the PCell; it can be up to 25 ms.

If IDC autonomous denial is configured then the UE shall also meet the requirements, provided not more than 30 IDC autonomous denial suframes are configured over an IDC autonomous denial validity period of at least 200 ms.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX or eDRX_CONN is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.9.

For UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], the UE Rx-Tx time difference measurement requirements in Section 8.1.2.7.2 shall apply also with different TDD UL/DL subframe configurations and/or different special subframe configurations used in CCs of different bands, under the following additional conditions:

- UE is not simultaneously scheduled in UL and DL on the different CCs, and
- At least one downlink and one uplink subframes per radio frame are available for the UE Rx-Tx time difference measurement in the measured cell.

The UE capable of SRS carrier based switching, when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission over one or more SCells without PUSCH, shall perform UE Rx-Tx time difference measurement and meet the requirements defined in Section 8.1.2.7.2 provided the following condition is met:

- at least one downlink subframe and one uplink subframe per radio frame are available for doing UE Rx-Tx time difference measurement at the UE in the PCell.

#### 8.1.2.7.2.1 UE Rx-Tx Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other RRC or LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in sub-clause 9.1.9.

### 8.1.2.7.3 E-UTRAN FDD Intra-frequency E-CID RSRP and RSRQ Measurements

#### 8.1.2.7.3.1 Introduction

The requirements in section 8.1.2.7.3 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN FDD intra-frequency RSRP and RSRQ measurements [24].

The UE capable of SRS carrier based switching, when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission over one or more SCells without PUSCH, shall perform UE Rx-Tx time difference measurement and meet the requirements defined in Section 8.1.2.7.3 provided the following condition is met:

- at least one downlink subframe and one uplink subframe per radio frame are available for doing UE Rx-Tx time difference measurement at the UE in the PCell.

#### 8.1.2.7.3.2 Measurement Requirements

The requirements in section 8.1.2.2.1 and section 8.1.2.8.1 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.1.2.7.3.3.

#### 8.1.2.7.3.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.2 and 9.1.5 respectively.

#### 8.1.2.7.4 E-UTRAN TDD Intra-frequency E-CID RSRP and RSRQ Measurements

##### 8.1.2.7.4.1 Introduction

The requirements in section 8.1.2.7.4 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN TDD intra-frequency RSRP and RSRQ measurements [24].

The UE capable of SRS carrier based switching, when configured to perform SRS carrier based switching for SRS transmission and/or RACH transmission over one or more SCells without PUSCH, shall perform UE Rx-Tx time difference measurement and meet the requirements defined in Section 8.1.2.7.4 provided the following condition is met:

- at least one downlink subframe and one uplink subframe per radio frame are available for doing UE Rx-Tx time difference measurement at the UE in the PCell.

##### 8.1.2.7.4.2 Measurement Requirements

The requirements in section 8.1.2.2.2 and section 8.1.2.8.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.1.2.7.4.3.

##### 8.1.2.7.4.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.2 and 9.1.5 respectively.

### 8.1.2.8 E-UTRAN intra-frequency measurements under time domain measurement resource restriction

The requirements in sections 8.1.2.8.1 and 8.1.2.8.2 shall apply for cells for which time domain measurement resource restriction patterns for performing E-UTRAN FDD intra-frequency measurements and E-UTRAN TDD intra-frequency measurements, respectively, are configured by higher layers (TS 36.331 [2]), provided that also the following additional conditions are fulfilled:

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the intra-frequency measurements, and

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

For cells which are not configured for measurements in the subframes indicated by the time-domain measurement resource restriction pattern, the corresponding requirements specified in Clause 8.1.2.2 apply.

#### 8.1.2.8.1 E-UTRAN FDD intra-frequency measurements

##### 8.1.2.8.1.1 E-UTRAN intra-frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra-frequency cell within

$$T_{identify_intra_eICIC} = T_{basic_identify_E\text{-}UTRA_FDD_eICIC,intra} \cdot \frac{T_{Measurement_Period_eICIC,Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_FDD_eICIC,\ intra}$ is 1000 ms.

$T_{Intra}$ is the minimum time available for intra-frequency measurements, during the measurement period with an arbitrarily chosen timing. The time is assumed to be available for performing intra-frequency measurements whenever the receiver is guaranteed to be active on the intra-frequency carrier.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.3 and 9.1.2.4 and RSRQ related side conditions given in Clause 9.1.5.2 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.8 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_eICIC,\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement_intra_eICIC}$ cells , where $Y_{measurement_intra_eICIC}$ is defined in the following equation. If the UE has identified more than $Y_{measurement_intra_eICIC}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement_intra_eICIC} = Floor\left\{ X_{basic_measurement_FDD_eICIC} \cdot \frac{T_{Intra}}{T_{Measurement_Period_eICIC,\ Intra}} \right\} \text{ cells}$$

where

$X_{basic_measurement_FDD_eICIC}$ = 8 (cells)

$T_{Measurement_Period_eICIC,\ Intra}$ = 200 ms is the measurement period for intra-frequency RSRP and RSRQ measurements.

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

#### 8.1.2.8.1.1.1 Measurement Reporting Requirements

##### 8.1.2.8.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

##### 8.1.2.8.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.1.1.1.3.

##### 8.1.2.8.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a

delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_eICIC}$ defined in Clause 8.1.2.8.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_eICIC}$ defined in clause 8.1.2.8.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_eICIC,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.1.2.8.1.2 E-UTRAN intra-frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_eICIC}$ as shown in table 8.1.2.8.1.2-1.

**Table 8.1.2.8.1.2-1: Requirement to identify a newly detectable FDD intra-frequency cell**

| DRX cycle length (s) | $T_{identify_intra_eICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (52) |
| 0.128 | 4.22 (33) |
| 0.128<DRX-cycle≤2.56 | Note2 (28) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.3 and 9.1.2.4 and RSRQ related side conditions given in Clause 9.1.5.2 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.8 for a corresponding Band.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is $T_{measure_intra_eICIC}$ as shown in table 8.1.2.8.1.2-2. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_eICIC}$.

**Table 8.1.2.8.1.2-2: Requirement to measure FDD intra-frequency cells**

| DRX cycle length (s) | $T_{measure_intra_eICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤0.16 | Note2 (7) |
| 0.16<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

#### 8.1.2.8.1.2.1 Measurement Reporting Requirements

##### 8.1.2.8.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

##### 8.1.2.8.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.1.2.1.3.

##### 8.1.2.8.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_eICIC}$ defined in Clause 8.1.2.8.1.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_eICIC}$ defined in clause 8.1.2.8.1.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_eICIC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.8.2 E-UTRAN TDD intra-frequency measurements

#### 8.1.2.8.2.1 E-UTRAN intra-frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra-frequency cell within

$$T_{identify_intra_eICIC} = T_{basic_identify_E\text{-}UTRA_TDD_eICIC,intra} \cdot \frac{T_{Measurement_Period_eICIC,Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_TDD_eICIC,\ intra}$ is 1000 ms.

$T_{Intra}$ is the minimum time available for intra-frequency measurements, during the measurement period with an arbitrarily chosen timing. The time is assumed to be available for performing intra-frequency measurements whenever the receiver is guaranteed to be active on the intra-frequency carrier.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.3 and 9.1.2.4 and RSRQ related side conditions given in Clause 9.1.5.2 are fulfilled for a corresponding Band,

- SCH_RP and SCH Ês/Iot according to Annex B.2.8 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_eICIC,\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells , including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement_intra_eICIC}$ cells , where $Y_{measurement_intra_eICIC}$ is defined in the following equation. If the UE has identified more than $Y_{measurement_intra_eICIC}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement_intra_eICIC} = Floor\left\{ X_{basic_measurement_TDD_eICIC} \cdot \frac{T_{Intra}}{T_{Measurement_Period_eICIC,\ Intra}} \right\} \text{ cells}$$

where

$X_{basic_measurement_TDD_eICIC}$ = 8 (cells)

$T_{Measurement_Period_eICIC,\ Intra}$ = 200 ms is the measurement period for intra-frequency RSRP and RSRQ measurements.

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

#### 8.1.2.8.2.1.1 Measurement Reporting Requirements

##### 8.1.2.8.2.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

##### 8.1.2.8.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.2.1.1.3.

##### 8.1.2.8.2.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_eICIC}$ defined in Clause 8.1.2.8.2.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_eICIC}$ defined in clause 8.1.2.8.2.1 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_eICIC,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.1.2.8.2.2 E-UTRAN intra-frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_eICIC}$ as shown in table 8.1.2.8.2.2-1.

**Table 8.1.2.8.2.2-1: Requirement to identify a newly detectable TDD intra-frequency cell**

| DRX cycle length (s) | $T_{identify_intra_eICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (52) |
| 0.128 | 4.22 (33) |
| 0.128<DRX-cycle≤2.56 | Note2 (28) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.3 and 9.1.2.4 and RSRQ related side conditions given in Clause 9.1.5.2 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.8 for a corresponding Band.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_eICIC}$ as shown in table 8.1.2.8.2.2-2. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_eICIC}$.

**Table 8.1.2.8.2.2-2: Requirement to measure TDD intra-frequency cells**

| DRX cycle length (s) | $T_{measure_intra_eICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤0.16 | Note2 (7) |
| 0.16<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

#### 8.1.2.8.2.2.1 Measurement Reporting Requirements

##### 8.1.2.8.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

#### 8.1.2.8.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.2.2.1.3.

#### 8.1.2.8.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.3, 9.1.2.4, and 9.1.5.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_eICIC}$ defined in Clause 8.1.2.8.2.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_eICIC}$ defined in clause 8.1.2.8.2.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_eICIC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.8.3 E-UTRAN FDD intra-frequency measurements with CRS assistance information

The requirements in clause 8.1.2.8.3 shall apply for the UEs supporting the PSS/SSS and common channel interference handling, and CRS interference handling features. Moreover, the core requirements shall be satisfied provided that the following additional conditions are fulfilled:

- The UE is provided with the CRS assistance information via higher layers (TS 36.331 [2]),
- The CRS assistance information is valid during the entire measurement period.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

#### 8.1.2.8.3.1 E-UTRAN intra-frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra-frequency cell within:

$$T_{identify_intra_FeICIC} = T_{basic_identify_E\text{-}UTRA_FDD_FeICIC,\ intra} \cdot \frac{T_{Measurement_Period_FeICIC,\ Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_FDD_FeICIC,\ intra}$ is 1000 ms.

$T_{Intra}$ is the minimum time available for intra-frequency measurements, during the measurement period with an arbitrarily chosen timing. The time is assumed to be available for performing intra-frequency measurements whenever the receiver is guaranteed to be active on the intra-frequency carrier.

A cell shall be considered detectable when:

- RSRP related side conditions given in Sections 9.1.2.5 and 9.1.2.6 and RSRQ related side conditions given in Section 9.1.5.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B, clause B.2.9 for a corresponding Band (Notes 1, 2).

Note 1: Part of the Iot includes the interference from at least:

- the PCell , or
- PCell and one intra-frequency neighbouring cell indicated in the CRS assistance information, or
- One or two intra-frequency neighbouring cells indicated in the CRS assistance information.

CRS assistance information has been provided for the intra-frequency neighbouring cells that generate interference. UE may use the CRS assistance information to mitigate the interference.

Note 2: An intra-frequency cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_FeICIC,\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern and the cells indicated in the CRS assistance information, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement_intra_FeICIC}$ cells , where $Y_{measurement_intra_FeICIC}$ is defined in the following equation. If the UE has identified more than $Y_{measurement_intra_FeICIC}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement_intra_FeICIC} = Floor\left\{ X_{basic_measurement_FDD_FeICIC} \cdot \frac{T_{Intra}}{T_{Measurement_Period_FeICIC,\ Intra}} \right\} \text{ cells}$$

where

$X_{basic_measurement_FDD_FeICIC}$ = 8 (cells).

$T_{Measurement_Period_FeICIC,\ Intra}$ = 200 ms is the measurement period for intra-frequency RSRP and RSRQ measurements.

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements with CRS assistance information shall be as specified in the sub-clauses 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

#### 8.1.2.8.3.1.1 Measurement Reporting Requirements

##### 8.1.2.8.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

##### 8.1.2.8.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.3.1.1.3.

#### 8.1.2.8.3.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_FeICIC}$ defined in Clause 8.1.2.8.3.1. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.3.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_FeICIC,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.8.3.2 E-UTRAN intra-frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_FeICIC}$ as shown in table 8.1.2.8.3.2-1.

**Table 8.1.2.8.3.2-1: Requirement to identify a newly detectable FDD intra-frequency cell**

| DRX cycle length (s) | $T_{identify_intra_FeICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note 1) |
| 0.04<DRX-cycle≤0.08 | Note 2 (52) |
| 0.128 | 4.22 (33) |
| 0.128<DRX-cycle≤2.56 | Note 2 (28] |
| NOTE 1: Number of DRX cycle depends upon the DRX cycle in use.<br>NOTE 2: Time depends upon the DRX cycle in use. | |

A cell shall be considered detectable when:

- RSRP related side conditions given in Sections 9.1.2.5 and 9.1.2.6 and RSRQ related side conditions given in Section 9.1.5.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B, clause B.2.9 for a corresponding Band (Notes 1, 2).

Note 1: Part of the Iot includes the interference from at least:

- the PCell , or
- PCell and one intra-frequency neighbouring cell indicated in the CRS assistance information, or
- One or two intra-frequency neighbouring cells indicated in the CRS assistance information.

CRS assistance information has been provided for the intra-frequency neighbouring cells that generate interference. UE may use the CRS assistance information to mitigate the interference.

Note 2: An intra-frequency cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is $T_{measure_intra_FeICIC}$ as shown in table 8.1.2.8.3.2-2. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified

intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern and the cell indicated in CRS assistance information, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_FeICIC}$.

**Table 8.1.2.8.3.2-2: Requirement to measure FDD intra-frequency cells**

| DRX cycle length (s) | $T_{identify_intra_FeICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note 1) |
| 0.04<DRX-cycle≤0.16 | Note 2 (7) |
| 0.16<DRX-cycle≤2.56 | Note 2 (5) |
| NOTE 1: Number of DRX cycle depends upon the DRX cycle in use.<br>NOTE 2: Time depends upon the DRX cycle in use. | |

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

#### 8.1.2.8.3.2.1 Measurement Reporting Requirements

##### 8.1.2.8.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

##### 8.1.2.8.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.3.2.1.3.

##### 8.1.2.8.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.3.2. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.3.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_FeICIC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.8.4 E-UTRAN TDD intra-frequency measurements with CRS assistance infromation

The requirements in clause 8.1.2.8.3 shall apply for the UEs upporting the PSS/SSS and common channel interference handling, and CRS interference handling features. Moreover, the core requirements shall be satisfied provided that the following additional conditions are fulfilled:

- The UE is provided with the CRS assistance information via higher layers (TS 36.331 [2]),
- The CRS assistance information is valid during the entire measurement period.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

#### 8.1.2.8.4.1 E-UTRAN intra-frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra-frequency cell within

$$T_{identify_intra_FeICIC} = T_{basic_identify_E\text{-}UTRA_TDD_FeICIC,\ intra} \cdot \frac{T_{Measurement_Period_FeICIC,\ Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_TDD_eICIC,\ intra}$ is 1000 ms.

$T_{Intra}$ is the minimum time available for intra-frequency measurements, during the measurement period with an arbitrarily chosen timing. The time is assumed to be available for performing intra-frequency measurements whenever the receiver is guaranteed to be active on the intra-frequency carrier.

A cell shall be considered detectable when:

- RSRP related side conditions given in Sections 9.1.2.5 and 9.1.2.6 and RSRQ related side conditions given in Section 9.1.5.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.9 for a corresponding Band (Notes 1, 2).

Note 1: Part of the Iot includes the interference from at least:

- the PCell , or
- PCell and one intra-frequency neighbouring cell indicated in the CRS assistance information, or
- One or two intra-frequency neighbouring cells indicated in the CRS assistance information

CRS assistance information has been provided for the intra-frequency neighbouring cells that generate interference. UE may use the CRS assistance information to mitigate the interference.

Note 2: An intra-frequency cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_FeICIC,\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is 200 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells , including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern and the cells indicated in the CRS assistance information, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement_intra_FeICIC}$ cells , where $Y_{measurement_intra_FeICIC}$ is defined in the following equation. If the UE has identified more than $Y_{measurement_intra_FeICIC}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement_intra_FeICIC} = Floor\left\{ X_{basic_measurement_TDD_FeICIC} \cdot \frac{T_{Intra}}{T_{Measurement_Period_FeICIC,\ Intra}} \right\} \text{ cells}$$

where

$X_{basic_measurement_TDD_FeICIC}$ = 8 (cells)

$T_{Measurement_Period_FeICIC,\ Intra}$ = 200ms is the measurement period for intra-frequency RSRP and RSRQ measurements.

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements with CRS assistance information shall be as specified in the sub-clauses 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

#### 8.1.2.8.4.1.1 Measurement Reporting Requirements

##### 8.1.2.8.4.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

##### 8.1.2.8.4.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.4.1.1.3.

##### 8.1.2.8.4.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.4.1. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.4.1 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_FeICIC,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.1.2.8.4.2 E-UTRAN intra-frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_FeICIC}$ as shown in table 8.1.2.8.4.2-1.

**Table 8.1.2.8.4.2-1: Requirement to identify a newly detectable TDD intra-frequency cell**

| DRX cycle length (s) | $T_{identify_intra_FeICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note 1) |
| 0.04<DRX-cycle≤0.08 | Note 2 (52) |
| 0.128 | 4.22 (33) |
| 0.128<DRX-cycle≤2.56 | Note 2 (28) |
| NOTE 1: Number of DRX cycle depends upon the DRX cycle in use.<br>NOTE 2: Time depends upon the DRX cycle in use. | |

A cell shall be considered detectable when:

- RSRP related side conditions given in Sections 9.1.2.5 and 9.1.2.6 and RSRQ related side conditions given in Section 9.1.5.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.9 for a corresponding Band (Notes 1, 2).

Note 1: Part of the Iot includes the interference from at least:

- the PCell , or
- PCell and one intra-frequency neighbouring cell indicated in the CRS assistance information, or
- One or two intra-frequency neighbouring cells indicated in the CRS assistance information.

CRS assistance information has been provided for the intra-frequency neighbouring cells that generate interference. UE may use the CRS assistance information to mitigate the interference.

Note 2: An intra-frequency cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_FeICIC}$ as shown in table 8.1.2.8.4.2-2. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells, including also the cells which are not measured in the subframes indicated by the time-domain measurement resource restriction pattern and the cell indicated in CRS assistance information, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_FeICIC}$.

**Table 8.1.2.8.4.2-2: Requirement to measure TDD intra-frequency cells**

| DRX cycle length (s) | $T_{identify_intra_FeICIC}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note 1) |
| 0.04<DRX-cycle≤0.16 | Note 2 (7) |
| 0.16<DRX-cycle≤2.56 | Note 2 (5) |
| NOTE 1: Number of DRX cycle depends upon the DRX cycle in use.<br>NOTE 2: Time depends upon the DRX cycle in use. | |

The RSRP and RSRQ measurement accuracy for the measured cells configured with a time-domain measurement resource restriction pattern for RRM intra-frequency measurements shall be as specified in the sub-clauses 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

#### 8.1.2.8.4.2.1 Measurement Reporting Requirements

##### 8.1.2.8.4.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

##### 8.1.2.8.4.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.1.2.8.2.2.1.3.

##### 8.1.2.8.4.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.2.5, 9.1.2.6, and 9.1.5.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T identify_intra_FeICIC defined in clause 8.1.2.8.4.2. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FeICIC}$ defined in clause 8.1.2.8.4.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_FeICIC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

## 8.1.2.9 E-UTRAN E-CID Measurements when Time Domain Measurement Resource Restriction Pattern is Configured

### 8.1.2.9.1 E-UTRAN FDD UE Rx-Tx Time Difference Measurements

The requirements in this clause apply for UE configured with a time-domain measurement resource restriction pattern for PCell measurements, provided that also the following additional conditions are fulfilled:

- The time domain measurement resource restriction pattern configured for the PCell (TS 36.331 [2]) indicates at least one subframe per radio frame for performing the PCell measurements, and
- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

When the UE is provided with a time-domain measurement resource restriction pattern for PCell measurements, the UE Rx-Tx time difference measurement shall meet the measurement requirements specified in Clause 8.1.2.7.1 and accuracy requirements specified in Clause 9.1.9.3, where the condition $\hat{E}s/Iot \geq$ -3dB in Table 9.1.9.3-1 corresponds to the CRS $\hat{E}s/Iot$ in subframes indicated by the time-domain measurement resource restriction pattern for PCell measurements (TS 36.331 [2]).

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

### 8.1.2.9.2 E-UTRAN TDD UE Rx-Tx Time Difference Measurements

The requirements in this clause apply for UE configured with a time-domain measurement resource restriction pattern for PCell measurements, provided that also the following additional conditions are fulfilled:

- The time domain measurement resource restriction pattern configured for the PCell (TS 36.331 [2]) indicates at least one subframe per radio frame for performing the PCell measurements, and
- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

When the UE is provided with a time-domain measurement resource restriction pattern for PCell measurements, the UE Rx-Tx time difference measurement shall meet the measurement requirements specified in Clause 8.1.2.7.2 and accuracy requirements specified in Clause 9.1.9.3, where the condition $\hat{E}s/Iot \geq$ -3dB in Table 9.1.9.3-1 corresponds to the CRS $\hat{E}s/Iot$ in subframes indicated by the time-domain measurement resource restriction pattern for PCell measurements (TS 36.331 [2]).

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

#### 8.1.2.9.3 E-UTRAN FDD UE Rx-Tx Time Difference Measurements with CRS Assistance Information

For UE configured with a time-domain measurement resource restriction pattern for PCell measurements, the requirements in this section apply under the following conditions:

- The time domain measurement resource restriction pattern configured for the PCell (TS 36.331 [2]) indicates at least one subframe per radio frame for performing the PCell measurements, and
- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern, and
- The UE is provided with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

When the UE is provided with a time-domain measurement resource restriction pattern for serving cell measurements, the UE Rx-Tx time difference measurement shall meet the measurement requirements specified in Section 8.1.2.7.1 and accuracy requirements specified in Section 9.1.9.4.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

#### 8.1.2.9.4 E-UTRAN TDD UE Rx-Tx Time Difference Measurements with CRS Assistance Information

For UE configured with a time-domain measurement resource restriction pattern for PCell measurements, the requirements in this section apply under the following conditions:

- The time domain measurement resource restriction pattern configured for the PCell (TS 36.331 [2]) indicates at least one subframe per radio frame for performing the PCell measurements, and
- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern, and
- The UE is provided with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

When the UE is provided with a time-domain measurement resource restriction pattern for serving cell measurements, the UE Rx-Tx time difference measurement shall meet the measurement requirements specified in Section 8.1.2.7.2 and accuracy requirements specified in Section 9.1.9.4.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

#### 8.1.2.10 Void

## 8.2 Capabilities for Support of Event Triggering and Reporting Criteria

### 8.2.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 8.2.2, the UE shall meet the performance requirements defined in clause 9.

The UE can be requested to make measurements under different measurement identities defined in TS 36.331 [2]. Each measurement identity corresponds to either event based reporting, periodic reporting, logged measurement reporting [2] or no reporting. In case of event based reporting, each measurement identity is associated with an event. In case of periodic reporting, a measurement identity is associated with one periodic reporting criterion. In case of logged measurement reporting, a measurement identity is associated with one logged measurement reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event, periodic, logged measurement and no reporting criteria the UE may be requested to track in parallel.

### 8.2.2 Requirements

In this clause a reporting criterion corresponds to either one event (in the case of event based reporting), or one periodic reporting criterion (in case of periodic reporting), or one logged measurement reporting criterion (in case of logged measurement reporting), or one no reporting criterion (in case of no reporting). For event based reporting, each instance of event, with the same or different event identities, is counted as separate reporting criterion in table 8.2.2-1.

The UE shall be able to support in parallel per category up to $E_{cat}$ reporting criteria according to table 8.2.2-1. For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells, E-UTRA inter-frequency cells, and inter-RAT per supported RAT(i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the total number of reporting criteria as follows:

- 26 reporting criteria in total if the UE is not configured with any SCell or PSCell carrier frequency,
- 35 reporting criteria in total if the UE is configured with one SCell carrier frequency,
- 44 reporting criteria in total if the UE is configured with two SCell carrier frequencies,
- 53 reporting criteria in total if the UE is configured with three SCell carrier frequencies,
- 62 reporting criteria in total if the UE is configured with four SCell carrier frequencies,
- 71 reporting criteria in total if the UE is configured with five SCell carrier frequencies,- 80 reporting criteria in total if the UE is configured with six SCell carrier frequencies,
- 35 reporting criteria in total if the UE is configured with one PSCell carrier frequency, and
- 44 reporting criteria in total if the UE is configured with one PSCell carrier frequency and one SCell carrier frequency.

Editor's note: the total reporting criteria are to be verified when the UE capabilities related to frame structure 3 are decided.

A UE supporting increased number of carriers to monitor beyond 3 carriers shall be able to support up to 20 reporting criteria for inter-frequency measurement category according to table 8.2.2-1. Additionally such UE shall be able to support in parallel per category up to $E_{cat}$ reporting criteria according to table 8.2.2-1. For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells, E-UTRA inter-frequency cells, and inter-RAT per supported RAT, the UE need not support more than the total number of reporting criteria as follows:

- 39 reporting criteria in total if the UE is not configured with any SCell carrier frequency,
- 48 reporting criteria in total if the UE is configured with one SCell carrier frequency,

- 57 reporting criteria in total if the UE is configured with two SCell carrier frequencies,
- 48 reporting criteria in total if the UE is configured with one PSCell carrier frequency,
- 57 reporting criteria in total if the UE is configured with one PSCell carrier frequency and one SCell carrier frequencies,
- 66 reporting criteria in total if the UE is configured with three SCell carrier frequencies, and
- 75 reporting criteria in total if the UE is configured with four SCell carrier frequencies.
- 84 reporting criteria in total if the UE is configured with five SCell carrier frequencies
- 93 reporting criteria in total if the UE is configured with six SCell carrier frequencies

Editor's note: the total reporting criteria are to be verified when the UE capabilities related to frame structure 3 are decided.

The UE, which is capable of supporting EN-DC operation with NR PSCell and one or more NR carrier frequencies, in total shall be able to support in parallel per category up to $E_{cat}$ reporting criteria according to table 8.2.2-1 in this section and table 9.1.4.2-1 in TS 38.133 [50]. For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells, E-UTRA inter-frequency cells, inter-RAT per supported RAT, and NR cells on serving and non-serving carrier frequencies (i.e. without counting other categories that the UE shall always support in parallel), the UE, when configured with EN-DC, needs not support more than the number of reporting criteria $E_{cat,EN-DC,NR} + E_{cat,EN-DC,E-UTRA}$ in total, , where

$E_{cat,EN-DC,NR}$ is specified in section 9.1.4.2 in TS 38.133 [50], and

$E_{cat,EN-DC,E-UTRA}$ is the total number of reporting criteria configured by PCell, except NR PSCell and NR SCells carrier frequencies:

- [36] reporting criteria if the UE is not configured with any SCell or PSCell carrier frequency , regardless of the number of NR SCell carrier frequencies if any,
-
- $36 + 9 \times$ reporting criteria if the UE is configured with at least one SCell, regardless of the number of NR SCell carrier frequencies if any, where is the number of configured SCells carrier frequencies.

The UE, which is capable of supporting and configured with NE-DC operation with PSCell and NR PCell and one or more NR carrier frequencies, in total shall be able to support in parallel per category up to $E_{cat}$ reporting criteria according to table 8.2.2-1 in this section and table 9.1.4.2-1 in TS 38.133 [50]. For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells and E-UTRA inter-frequency cells, inter-RAT per supported RAT, and NR cells on serving and non-serving carrier frequencies (i.e. without counting other categories that the UE shall always support in parallel), the UE, when configured with NE-DC, needs not support more than the number of reporting criteria $E_{cat,NE-DC,NR} + E_{cat,NE-DC,E-UTRA}$ in total , where:

$E_{cat,NE-DC,NR}$ is specified in section 9.1.4.2 in TS 38.133 [50], and

$E_{cat,NE-DC,E-UTRA} = E_{cat,NE-DC,E-UTRA,inter-RAT} + E_{cat,NE-DC,E-UTRA,intra-RAT}$, where

$E_{cat,NE-DC,E-UTRA,inter-RAT}$ is specified in section 9.1.4.2 in TS 38.133 [50], and

$E_{cat,NE-DC,E-UTRA,intra-RAT}$ is the total number of E-UTRA reporting criteria, including PSCell and SCells carrier frequencies:

- 19 reporting criteria if the UE is not configured with any SCell, regardless of the number of NR SCell carrier frequencies if any.
- $10 + 9 \times k$ reporting criteria if the UE is configured with at least one SCell, where *k* is the number of configured E-UTRA serving carrier frequencies, including PSCell and SCells carrier frequencies, regardless of the number of NR SCell carrier frequencies if any.

**Table 8.2.2-1: Requirements for reporting criteria per measurement category**

| Measurement category | $E_{cat}$ | Note |
|---|---|---|
| Intra-frequency Note 1, 5, 6 | 10 | Events for any one or a combination of intra-frequency RSRP, RSRQ, and RS-SINR Note4 for E-UTRA intra-frequency cells |
| Intra-frequency UE Rx-Tx time difference Note 5 | 2 | Intra-frequency UE Rx-Tx time difference measurements reported to E-UTRAN via RRC and to positioning server via LPP. Applies for UE supporting both LPP and UE Rx-Tx time difference measurement. |
| Intra-frequency RSTD Note 2, 5, 6 | 1 | Intra-frequency RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 cell measurements for the intra-frequency |
| Intra-frequency RSRP and RSRQ measurements for E-CID Note 5, 6 | 1 | Intra-frequency RSRP and RSRQ measurements for E-CID reported to E-SMLC via LPP [24]. One report capable of at least in total 9 intra-frequency RSRP and RSRQ measurements. Applicable to UE capable of reporting RSRP and RSRQ to E-SMLC via LPP. |
| Intra-frequency RSSI and channel occupancy measurements under operation with frame structure 3 | 1 | One report capable of one UE RSSI and channel occupancy measurement s per serving carrier frequency. Applicable for UE capable of performing and reporting UE RSSI and channel occupancy under operation with frame structure 3. |
| Inter-frequency Note 5, 6 | 10 / 28 | Events for any one or a combination of inter-frequency RSRP, RSRQ, and RS-SINR Note4 for E-UTRA inter-frequency cells (see note 3) |
| Inter-frequency RSTD Note 2, 5, 6 | 1 | Inter-frequency RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 cell measurements for at least one inter-frequency. Only applicable as specified in Section 8.1.2.6. |
| Inter-frequency RSSI and channel occupancy measurements under operation with frame structure 3 | 1 | One report capable of one UE RSSI and channel occupancy measurement s for an inter-frequency. Applicable for UE capable of performing and reporting UE RSSI and channel occupancy under operation with frame structure 3. |
| Inter-RAT (GSM, cdma2000 1 x RTT and HRPD) Note 5 | 5 | Only applicable for UE with this (inter-RAT) capability. This requirement ($\mathbf{E_{cat}}$ = 5) is per supported RAT. |
| Inter-RAT (UTRAN FDD, UTRAN TDD) Note 5 | 5 or 11 | Only applicable for UE with this (inter-RAT) capability. This requirement ($\mathbf{E_{cat}}$ = 5 or 11) is per supported RAT. For UE which indicate support for Increased UE carrier monitoring UTRA $\mathbf{E_{cat}}$ = 11. |
| Inter-RAT NR carrier frequency Note 5 | 10 | Events for NR cells on all inter-RAT NR carrier frequencies for UE capable of EN-DC operation. Only applicable for UE with this capability and measurements on any of the NR carrier frequencies other than the carrier frequency of the NR PSCell or NR SCell. |
| MBSFN measurements for MDT | 1 | MBSFN measurement reporting for UE supporting MBSFN measurements (MBSFN RSRP, MBSFN RSRQ, and MCH BLER) for MDT [2]; 1 report capable of minimum 1 MBSFN RSRP measurement [4], 1 MBSFN RSRQ measurement [4], and 1 MCH BLER measurement [4]. |

| | |
|---|---|
| Note 1: | When the UE is configured with SCell, PSCell, PCell or NR PSCell carrier frequency, $E_{cat}$ for Intra-frequency is applied per serving frequency. |
| Note 2: | When the UE is configured with one SCell carrier frequency, the UE shall be capable of supporting at least 2 reporting criteria for all RSTD measurements configured to be performed on PCell carrier frequency, SCell carrier frequency and inter-frequency carrier. When the UE is configured with two SCell carrier frequencies, the UE shall be capable of supporting at least 3 reporting criteria for all RSTD measurements configured to be performed on PCell carrier frequency, the two SCell carrier frequencies and inter-frequency carrier. These requirements apply when there is a single on-going LPP OTDOA location session. |
| Note 3: | Support of Ecat of 28 for Measurement category Inter-frequency is applied for a UE supporting increased number of carriers to monitor beyond 3. |
| Note 4: | For UEs supporting RS-SINR measurements |
| Note 5: | Applicable for UE configured with EN-DC operation mode. |
| Note 6: | Applicable for UE configured with NE-DC operation mode. |

# 8.3 Measurements for E-UTRA carrier aggregation

## 8.3.1 Introduction

Requirements in this clause are applicable to UE supporting E-UTRA FDD, E-UTRA TDD and/or E-UTRA TDD-FDD carrier aggregation.

Non configured frequencies may be measured with measurement gaps or autonomous gaps according to the requirements in clause 8.1.2.3 (E-UTRAN inter frequency measurements and E-UTRAN inter frequency measurements with autonomous gaps).

For UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331, and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101, the inter-band CA requirements in Section 8.3 shall apply also with different TDD UL/DL subframe configurations and/or different special subframe configurations used in CCs of different bands, under the following additional conditions:

- UE is not simultaneously scheduled in UL and DL on the different CCs, and
- at least DL subframe #0 or DL subframe #5 are available for measurements in the measured cell.

The UE capable of SRS carrier based switching, when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.3 provided the following condition is met:

- at least DL subframe #0 or DL subframe #5 per radio frame is available for measurements at the UE in the measured cell.

## 8.3.2 Measurements of the primary component carrier

Measurements of cells on the primary component carrier shall meet all applicable requirements (FDD or TDD) in clause 8.1.2.2 (E-UTRAN intra frequency measurements and E-UTRAN intra frequency measurements with autonomous gaps)

## 8.3.3 Measurements of a secondary component carrier

A Secondary component carrier may be activated, hibernated and deactivated by MAC-CE commands as specified in [17]. The applicable performance requirements depend on whether the SCell on the corresponding frequency is actived, dormant or deactivated.

### 8.3.3.1 Measurements of a secondary component carrier with active SCell

When the SCell is activated or dormant, measurement performance requirements for the frequency are those given in clause 8.1.2.2 (E-UTRAN intra frequency measurements and E-UTRAN intra frequency measurements with autonomous gaps). If common DRX is in use, then the requirements for that secondary component carrier are given by the applicable DRX requirements (FDD or TDD) in clause 8.1.2.2, otherwise the non DRX requirements are applicable. When *highSpeedEnhancedMeasFlag* or *highSpeedEnhMeasFlag2-r16* is configured and *highSpeedEnhMeasFlagSCell-r16 is not configured*, the enhanced measurement requirements apply only to measurements of the primary component carrier and do not apply to measurements of a secondary component carrier with active SCell. When

*highSpeedEnhancedMeasFlag* and *highSpeedEnhMeasFlagSCell-r16* are configured, the enhanced measurement requirements apply to measurements of the primary component carrier and all secondary component carriers with active or dormant SCells. The applicable measurement accuracy requirements are in clause 9.1.11 (Carrier aggregation measurement accuracy)

### 8.3.3.2 Measurements of a secondary component carrier with deactivated SCell

This clause defines the measurement requirements of a secondary component carrier with deactivated SCell based on the parameter *measCycleSCell* defined in TS 36.331 [2].

#### 8.3.3.2.1 E-UTRAN secondary component carrier measurements when no common DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD or TDD cell on a secondary component carrier within $T_{identify_scc}$, according to the parameter *measCycleSCell* where $T_{identify_scc}$ = 20 *measCycleSCell* when *highSpeedEnhMeasFlagSCell-r16* is not configured or $T_{identify_scc}$ = 10 *measCycleSCell* when *highSpeedEnhMeasFlagSCell-r16* is configured.

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Clause 9.1.17.2.1 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH $\hat{E}s/Iot$ according to Annex B.2.7 for a corresponding Band.

The measurement period for deactivated scell measurements is $T_{measure_scc}$ according to the parameter *measCycleSCell* where $T_{measure_scc}$ = 5 *measCycleSCell* when *highSpeedEnhMeasFlagSCell-r16* is not configured or $T_{measure_scc}$ = 3 *measCycleSCell* when *highSpeedEnhMeasFlagSCell-r16* is configured.

The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc}$.

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.11 (Carrier aggregation measurement accuracy)

A UE may reconfigure the receiver bandwidth or turn on/off one of the RF chains when performing measurements on up to six SCCs with deactivated SCell. This may cause interruptions on PCell or activated SCell(s) or both that are specified in Section 7.8.

##### 8.3.3.2.1.1 Measurement Reporting Requirements

###### 8.3.3.2.1.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the applicable requirements in clause 9.

###### 8.3.3.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the applicable requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.3.3.2.1.1.3.

###### 8.3.3.2.1.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the applicable requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc}$ defined in Clause 8.3.3.2.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_scc}$ defined in clause 8.3.3.2.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering, or the UE is configured to perform SRS carrier based switching, is used an additional delay can be expected.

#### 8.3.3.2.2 E-UTRAN secondary component carrier measurements when common DRX is used

When DRX is in use and *highSpeedEnhMeasFlagSCell-r16* is not configured, the UE shall be able to identify a new detectable FDD or TDD cell on a secondary component carrier within $T_{identify_scc}$, according to the parameter *measCycleSCell* where $T_{identify_scc}$ = max(20 *measCycleSCell*, $T_{identify_scc1}$). $T_{identify_scc1}$ is given in table 8.3.3.2.2-1. When DRX is in use and *highSpeedEnhMeasFlagSCell-r16* is configured, the UE shall be able to identify a new detectable FDD or TDD cell on a secondary component carrier within $T_{identify_scc}$, according to the parameter *measCycleSCell* where $T_{identify_scc}$ = max(10 *measCycleSCell*, $T_{identify_scc1}$). $T_{identify_scc1}$ is given in table 8.3.3.2.2-1a.

**Table 8.3.3.2.2-1: Requirement for $T_{identify_scc1}$ when *highSpeedEnhMeasFlagSCell-r16* is not configured**

| DRX cycle length (s) | $T_{identify_scc1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (40) |
| 0.128 | 3.2 (25) |
| 0.128<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.3.3.2.2-1a: Requirement for $T_{identify_scc1}$ *when highSpeedEnhMeasFlagSCell-r16* is configured**

| DRX cycle length (s) | $T_{identify_scc1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.8 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(15) |
| 0.08<DRX-cycle≤1.28 | Note2(10) |
| 1.28<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,

- RS-SINR related side conditions given in Clause 9.1.17.2.1 are fulfilled for a corresponding Band,
- SCH_RP|$_{dBm}$ and SCH Ês/Iot according to Annex B.2.7 for a corresponding Band.

When *highSpeedEnhMeasFlagSCell-r16* is not configured, the measurement period for deactivated scell measurements is $T_{measure_scc}$ according to the parameter *measCycleSCell* where $T_{measure_scc}$ =max( 5 *measCycleSCell*, $T_{measure_scc1}$). When *highSpeedEnhMeasFlagSCell-r16* is configured , the measurement period for deactivated scell measurements is $T_{measure_scc}$ according to the parameter *measCycleSCell* where $T_{measure_scc}$ =max( 3 *measCycleSCell*, $T_{measure_scc1}$). The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements for 8 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc}$. $T_{measure_scc1}$ is given in table 8.3.3.2.2-2 and table 8.3.3.2.2-2a.

**Table 8.3.3.2.2-2: Requirement for $T_{measure_scc1}$ when *highSpeedEnhMeasFlagSCell-r16* is not configured**

| DRX cycle length (s) | $T_{measure_scc1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.3.3.2.2-2a: Requirement for $T_{measure_scc1}$ when *highSpeedEnhMeasFlagSCell-r16* is configured**

| DRX cycle length (s) | $T_{measure_scc1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2(4) |
| 0.08<DRX-cycle≤1.28 | Note2(3) |
| 1.28<DRX-cycle≤2.56 | Note2(5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note2: Time depends upon the DRX cycle in use. | |

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.11 (Carrier aggregation measurement accuracy).

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, and when making measurements of cells on up to six SCCs with deactivated SCell. This may cause interruptions (packet drops) to a PCell or activated SCell(s) or both when the PCell and the SCell belong to the same frequency band. No interruptions while the On Duration timer is running shall be allowed when common DRX is used. The requirement considers only interruptions due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

### 8.3.3.2.2.1 Measurement Reporting Requirements

#### 8.3.3.2.2.1.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the applicable requirements in clause 9.

#### 8.3.3.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the applicable requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.3.3.2.2.1.3.

#### 8.3.3.2.2.1.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the applicable requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc}$ defined in Clause 8.3.3.2.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_scc}$ defined in clause 8.3.3.2.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.3.3.3 Measurements on a secondary component carrier with FeMBMS/Unicast mixed cells and activated SCell

Requirements in this section apply for UE configured to operate on a secondary component carrier with activated SCell and one or more FeMBMS/Unicast mixed cells and capable of receiving at least one of *SystemInformationBlockType15* or *fembms-MixedCarrier-r14* indication and are provided with the information that one or more FeMBMS/Unicast mixed cells are present on the secondary component carrier to be measured.

The UE shall meet the requirements in Section 8.3.3.1, when performing measurements on a secondary component carrier with an active SCell and at least one FeMBMS/Unicast mixed cell which may or may not be the active SCell. The minimum number of cells that the UE shall be able to measure on includes also FeMBMS/Unicast mixed cells.

### 8.3.3.4 Measurements on a secondary component carrier with FeMBMS/Unicast mixed cells and deactivated SCell

Requirements in this section apply for UE configured to operate on a secondary component carrier with deactivated SCell and one or more FeMBMS/Unicast mixed cells and which are capable of receiving at least one of *SystemInformationBlockType15* or *fembms-MixedCarrier-r14* indication and are provided with the information that one or more FeMBMS/Unicast mixed cells are present on the secondary component carrier to be measured.

The UE shall meet the requirements in Section 8.3.3.2, when performing measurements on a secondary component carrier with a deactivated SCell and at least one FeMBMS/Unicast mixed cell which may or may not be the deactiveted SCell. The minimum number of cells that the UE shall be able to measure on includes also FeMBMS/Unicast mixed cells.

## 8.4 OTDOA RSTD Measurements for E-UTRAN carrier aggregation

### 8.4.1 Introduction

This clause contains RSTD measurement requirements on UE capabilities for support of E-UTRA carrier aggregation. Requirements in this clause are applicable to all carrier aggregation capable UE which have been configured with one or two downlink Scell(s). Non-configured frequencies may be measured with measurement gaps according to the requirements in clause 8.1.2.6, i.e., E-UTRAN inter-frequency RSTD measurement period applies. Requirements in this clause are applicable for E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD carrier aggregation.

For UE, which does not support simultaneous reception and transmission for inter-band TDD CA specified in TS 36.331 [2], and is compliant to the requirements for inter-band CA with uplink in one E-UTRA band and without simultaneous Rx/Tx specified in TS 36.101 [5], RSTD requirements in Section 8.4 shall apply also with different TDD UL/DL subframe configurations and/or different special subframe configurations used in CCs of different bands, under the following additional conditions:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.10 are available for RSTD measurements in the measured and reference cells; and

- UE is not simultaneously scheduled in UL and DL on the different CCs.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.4 provided the following condition is met:

all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.10 are available for RSTD measurements at the UE in the measured and reference cells.

If network-based CRS interference mitigation is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting network-based CRS interference mitigation shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS, with N1= 0 and N2=0 subframes before and after the indicated PRS subframes respectively, during all positioning occasions within the RSTD measurement period.

## 8.4.2 Measurements on the primary component carrier

The RSTD measurements on cells belonging to the primary component carrier shall meet all applicable requirements (FDD or TDD) specified in clause 8.1.2.5, i.e., E-UTRAN intra-frequency RSTD measurement period applies.

The RSTD measurement accuracy for all the measurements on the primary component carrier shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.12.

If the PCell is changed, regardless whether the primary component carrier is changed or not while the RSTD measurements are being performed on cells belonging to the primary component carrier, then the UE shall complete the ongoing OTDOA measurement session. In case of change of the primary component carrier, the requirements shall apply only if the primary component carrier is swapped with any of the currently configured secondary component carrier(s). The UE shall also meet the OTDOA measurement and accuracy requirements for the primary component carrier. However in this case the total RSTD measurement period ($T_{\text{RSTD,E-UTRAN,PCell_change}}$) shall be according to the following expression:

$$T_{\text{RSTD,E-UTRAN,PCell_change}} = T_{\text{RSTD,E-UTRAN}} + K \times T_{\text{PRS}} + T_{\text{PCell_change}} \quad ms,$$

where:

$K$ is the number of times the PCell is changed during $T_{\text{RSTD,E-UTRAN,PCell_change}}$,

$T_{\text{PRS}}$ is defined in clause 8.1.2.5,

$T_{\text{PCell_change}}$ is the time during which the RSTD measurement may not be possible due to PCell change; it can be up to 25 ms,

$T_{\text{RSTD,E-UTRAN}}$ corresponds to the E-UTRAN intra-frequency RSTD measurement period as specified in clause 8.1.2.5.

Furthermore, due to the PCell changing the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCell/SCell(s) on whose carriers RSTD measurement is performed during the RSTD measurement period.

## 8.4.3 Measurements on a secondary component carrier

The RSTD measurements when all cells are on a configured secondary component carrier shall meet all applicable requirements (FDD or TDD) specified in clause 8.1.2.5, i.e., E-UTRAN intra-frequency RSTD measurement period applies, regardless of whether the Scell on the corresponding frequency is activated or deactivated by the MAC-CE commands as specified in [17].

The RSTD measurement accuracy for all the measurements on the secondary component carrier shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.12.

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, RACH transmission over SCell without PUSCH if capable of SRS carrier based switching, and when making RSTD measurements on cells belonging to SCC with deactivated SCell. This may cause interruptions (packet drops) to a PCell when the PCell and the SCell belong to the adjacent or non-adjacent component carriers in the same frequency band or to different frequency bands. In this case, the UE shall follow the interruption requirements specified in Section 7.10. No interruption to the PCell shall be allowed during the PRS positioning occasion on the PCell.

If the PCell is changed, regardless whether the primary component carrier is changed or not while the RSTD measurements are being performed on cells belonging to the secondary component carrier, then the UE shall complete the ongoing OTDOA measurement session. In case of change of the primary component carrier, the requirements shall apply only if the primary component carrier is swapped with any of the currently configured secondary component carrier(s). The UE shall also meet the OTDOA measurement and accuracy requirements for the secondary component carrier. However in this case the total RSTD measurement period ( $T_{\text{RSTD,E-UTRAN,PCell_change}}$ ) shall be according to the following expression:

$$T_{\text{RSTD,E-UTRAN,PCell_change}} = T_{\text{RSTD,E-UTRAN}} + K \times T_{\text{PRS}} + T_{\text{PCell_change}} \quad ms,$$

where:

$K$ is the number of times the PCell is changed during $T_{\text{RSTD,E-UTRAN,PCell_change}}$,

$T_{\text{PRS}}$ is defined in clause 8.1.2.5,

$T_{\text{PCell_change}}$ is the time during which the RSTD measurement may not be possible due to PCell change; it can be up to 25 ms,

$T_{\text{RSTD,E-UTRAN}}$ corresponds to the E-UTRAN intra-frequency RSTD measurement period as specified in clause 8.1.2.5.

Furthermore, due to the PCell changing the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCell/SCell(s) on whose carriers RSTD measurement is performed during the RSTD measurement period.

## 8.4.4 Measurements on both primary component carrier and a secondary component carrier

The RSTD measurements of cells on both primary component carrier and a configured secondary component carrier shall meet all applicable requirements (FDD-FDD, TDD-TDD, TDD-FDD or FDD-TDD inter-Frequency OTDOA) specified in clause 8.1.2.6, i.e., E-UTRAN inter-frequency RSTD measurement period applies regardless of whether the SCell on the corresponding frequency is activated or deactivated by the MAC-CE commands as specified in [17], with the following exceptions

- the number of PRS positioning occasions is as specified in Table 8.4.4-1 shall apply, and
- TDD uplink-downlink subframes configurations as specified in Clause 8.1.2.5.2, Table 8.1.2.5.2-2 shall apply.

**Table 8.4.4-1: Number of PRS positioning occasions within measurement period**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ |
|---|---|
| 160 ms | 32 |
| >160 ms | 16 |

The RSTD measurement accuracy for all the measurements on both primary component carrier and the secondary component carrier shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.12.

A UE may reconfigure its receiver bandwidth taking into account the SCell activation/deactivation status, RACH transmission over SCell without PUSCH if capable of SRS carrier based switching, and when performing RSTD measurements on cells belonging to at least SCC with deactivated SCell. This may cause interruptions (packet drops) on a PCell when the PCell and the SCell belong to the adjacent or non-adjacent component carriers in the same frequency band or to different frequency bands. In this case, the UE shall follow the interruption requirements specified in Section 7.10. No interruption to the PCell shall be allowed during the PRS positioning occasion on the PCell.

If the PCell is changed regardless whether the primary component carrier is changed or not while the RSTD measurements are being performed on cells belonging to both the primary component carrier and the secondary component carrier then the UE shall complete the ongoing OTDOA measurement session. In case of change of the primary component carrier, the requirements shall apply only if the primary component carrier is swapped with any of the currently configured secondary component carrier(s). The UE shall also meet the OTDOA measurement and accuracy requirements for the primary and secondary component carrier. However in this case the total RSTD measurement period ( $T_{RSTD,E\text{-}UTRAN,PCell_change}$) shall be according to the following expression:

$$T_{RSTD,E\text{-}UTRAN,PCell_change} = T_{RSTD,E\text{-}UTRAN} + K \times T_{PRS} + T_{PCell_change} \quad ms,$$

where:

$K$ is the number of times the PCell is changed during $T_{RSTD,E\text{-}UTRAN,PCell_change}$,

$T_{PRS}$ is defined in clause 8.1.2.6,

$T_{PCell_change}$ is the time during which the RSTD measurement may not be possible due to PCell change; it can be up to 25 ms,

$T_{RSTD,E\text{-}UTRAN}$ corresponds to the E-UTRAN inter-frequency RSTD measurement period as specified in clause 8.1.2.6 with the exception that the number of PRS positioning occasions is as specified in Table 8.4.4-1.

Furthermore, due to the PCell changing the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCell/SCell(s) on whose carriers RSTD measurement is performed during the RSTD measurement period.

## 8.4.5 Measurements on different secondary component carriers

The RSTD measurements of cells on a configured secondary component carrier and another configured secondary component carrier shall meet all applicable requirements (FDD-FDD, TDD-TDD, TDD-FDD or FDD-TDD inter-Frequency OTDOA) specified in clause 8.1.2.6, i.e., E-UTRAN inter-frequency RSTD measurement period applies regardless of whether the SCell on the corresponding frequency is activated or deactivated by the MAC-CE commands as specified in [17], with the following exceptions

- the number of PRS positioning occasions is as specified in Table 8.4.4-1 shall apply, and
- TDD uplink-downlink subframes configurations as specified in Clause 8.1.2.5.2, Table 8.1.2.5.2-2 shall apply.

**Table 8.4.4-1: Number of PRS positioning occasions within measurement period**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ |
|---|---|
| 160 ms | 32 |
| >160 ms | 16 |

The RSTD measurement accuracy for all the measurements on the secondary component carriers shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.12.

A UE may reconfigure its receiver bandwidth taking into account the SCell activation/deactivation status, RACH transmission over SCell without PUSCH if capable of SRS carrier based switching, and when performing RSTD measurements on cells belonging to at least SCC with deactivated SCell. This may cause interruptions (packet drops) on a PCell when the PCell and the SCell belong to the adjacent or non-adjacent component carriers in the same frequency band or to different frequency bands. In this case, the UE shall follow the interruption requirements specified in Section 7.10. No interruption to the PCell shall be allowed during the PRS positioning occasion on the PCell. No interruption to the SCells shall be allowed during the PRS positioning occasion on the SCells.

If the PCell is changed regardless whether the primary component carrier is changed or not while the RSTD measurements are being performed on cells belonging to the secondary component carriers then the UE shall complete the ongoing OTDOA measurement session. In case of change of the primary component carrier, the requirements shall apply only if the primary component carrier is swapped with any of the currently configured secondary component carrier(s). The UE shall also meet the OTDOA measurement and accuracy requirements for the secondary component carriers. However in this case the total RSTD measurement period ( $T_{RSTD,E\text{-}UTRAN,PCell_change}$ ) shall be according to the following expression:

$$T_{RSTD,E\text{-}UTRAN,PCell_change} = T_{RSTD,E\text{-}UTRAN} + K \times T_{PRS} + T_{PCell_change} \quad ms,$$

where:

$K$ is the number of times the PCell is changed during $T_{RSTD,E\text{-}UTRAN,PCell_change}$,

$T_{PRS}$ is defined in clause 8.1.2.6,

$T_{PCell_change}$ is the time during which the RSTD measurement may not be possible due to PCell change; it can be up to 25 ms,

$T_{RSTD,E\text{-}UTRAN}$ corresponds to the E-UTRAN inter-frequency RSTD measurement period as specified in clause 8.1.2.6 with the exception that the number of PRS positioning occasions is as specified in Table 8.4.4-1.

Furthermore, due to the PCell changing the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of those PCell/SCell(s) on whose carriers RSTD measurement is performed during the RSTD measurement period.

# 8.5 Measurements for UE category 0

## 8.5.1 Introduction

The UE category 0 applicability of the requirements in subclause 8.5 is defined in Section 3.6.1.

This clause contains requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are specified for E-UTRA intra frequency measurements. These measurements may be used by the E-UTRAN, e.g. for handover decisions. The measurement quantities are defined in [4], the measurement model is defined in [22] and measurement accuracies are specified in clause 9. Control of measurement reporting is specified in TS 36.331 [2].

When the UE is provided with IDC solution, the UE shall also perform RRM measurements and meet the corresponding requirements in clause 8.

## 8.5.2 Requirements

### 8.5.2.1 E-UTRAN intra frequency measurements

The UE shall be able to identify new intra-frequency cells and perform RSRP measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency cells and additionally search for and identify new intra frequency cells.

#### 8.5.2.1.1 E-UTRAN FDD intra frequency measurements

##### 8.5.2.1.1.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within

$$T_{identify\ intra_UE\,cat\,0} = T_{basic_identify_E\text{-}UTRA_FDD_UE\,cat\,0} \cdot \frac{T_{Measurement_Period_UE\,cat\,0,\,Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_FDD_UE\,cat\,0,\,intra}$ is 1000 ms

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.13.1 and 9.1.13.2 and RSRQ related side conditions given in Clause 9.1.13.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

For category 1bis UE, a cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.7 and 9.1.2.8 and RSRQ related side conditions given in Clause 9.1.5.5 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

$T_{Intra}$ : This is the minimum time that is available for intra frequency measurements, during the measurement period with an arbitrarily chosen timing. Time is assumed to be available for performing intra frequency measurements whenever the receiver is guaranteed to be active on the intra frequency carrier.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_UE\,cat\,0\,Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 400 ms. When no measurement gaps are activated, the low complexity UE shall be capable of performing RSRPand RSRQ measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 400 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement\ intra_UE\,cat\,0}$ cells , where $Y_{measurement\ intra_UE\,cat\,0}$ is defined in the following equation. If the UE has identified more than $Y_{measurement\ intra_UE\,cat\,0}$ cells, the UE shall perform measurements of at least 8 identified intra- frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement_intra_UE\,cat\,0} = Floor\left\{ X_{basic_measurement_FDD_UE\,cat\,0} \cdot \frac{T_{Intra}}{T_{Measurement_Period_UE\,cat\,0,\,Intra}} \right\}$$

cells where

$X_{basic\ measurement\ FDD_UE\,cat\,0}$ = 8 (cells)

$T_{Measurement_Period_UE\,cat\,0,\,Intra}$ = 400 ms. The measurement period for Intra frequency RSRP and RSRQ measurements.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.13.1 and 9.1.13.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.13.3.For category 1bis UE, the RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.7 and 9.1.2.8, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.5.

#### 8.5.2.1.1.1.1 Measurement Reporting Requirements

##### 8.5.2.1.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

##### 8.5.2.1.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.5.2.1.1.1.1.3.

##### 8.5.2.1.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ 0}$ defined in Clause 8.5.2.1.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ 0}$ defined in clause 8.5.2.1.1.1 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_UE\ cat\ 0,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.5.2.1.1.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.1.2-1. When eDRX_CONN is in use the UE shall be able to identify a new detectable FDD intra-frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.1.2-1A.

**Table 8.5.2.1.1.2-1: Requirement to identify a newly detectable FDD intrafrequency cell**

| DRX cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (40) |
| 0.128 | 3.2 (25) |
| 0.128<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.5.2.1.1.2-1A: Requirement to identify a newly detectable FDD intra-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note(20) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.13.1 and 9.1.13.2 and RSRQ related side conditions given in Clause 9.1.13.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band

For category 1bis UE, a cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.7 and 9.1.2.8 and RSRQ related side conditions given in Clause 9.1.5.5 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ 0}$. When DRX is used, $T_{measure_intra_UE\ cat\ 0}$ is as defined in table 8.5.2.1.1.2-2, when eDRX_CONN is used, $T_{measure_intra_UE\ cat\ 0}$ is as defined in table 8.5.2.1.1.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ 0}$.

**Table 8.5.2.1.1.2-2: Requirement to measure FDD intrafrequency cells**

| DRX cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.08 | 0.4 (Note1) |
| 0.08<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.5.2.1.1.2-3: Requirement to measure FDD intra-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.13.1 and 9.1.13.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.13.3.

For category 1bis UE, the RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.7 and 9.1.2.8, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.5.

8.5.2.1.1.2.1 Measurement Reporting Requirements

8.5.2.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

#### 8.5.2.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.5.2.1.1.2.1.3.

#### 8.5.2.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra,\ UE\ cat\ 0}$ defined in Clause 8.5.2.1.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ 0}$ defined in clause 8.5.2.1.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ 0}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.5.2.1.2 E-UTRAN intra frequency measurements for HD-FDD

#### 8.5.2.1.2.1 E-UTRAN intra frequency measurements when no DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.5.2.1.1.1 also apply for this section provided the following conditions are met:

- at least downlink subframe # 0 or downlink subframe # 5 per radio frame of an intra-frequency cell to be identified by the UE is available at the UE over $T_{identify_intra_UE\ cat\ 0}$;
- at least one downlink subframe per radio frame of measured cell is available at the UE for RSRP and RSRQ measurements assuming measured cell is identified cell over $T_{measure_intra_UE\ cat\ 0}$.

#### 8.5.2.1.2.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.2.2-1. When eDRX_CONN is in use the UE shall be able to identify a new detectable FDD intra-frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.2.2-1A.

**Table 8.5.2.1.2.2-1: Requirement to identify a newly detectable HD-FDD intrafrequency cell**

| DRX cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (50) |
| 0.128 | 3.2 (32) |
| 0.128<DRX-cycle≤2.56 | Note2(25) |

| |
|---|
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use |

**Table 8.5.2.1.2.2-1A: Requirement to identify a newly detectable HD-FDD intra-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (25) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.13.1 and 9.1.13.2 and RSRQ related side conditions given in Clause 9.1.13.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band

When DRX is in use, in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.2.2-2. When eDRX_CONN is in use in the RRC_CONNECTED state, the measurement period for intra-frequency measurements is $T_{measure_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.2.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ 0}$.

**Table 8.5.2.1.2.2-2: Requirement to measure HD-FDD intrafrequency cells**

| DRX cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.4 (Note1) |
| 0.04<DRX-cycle≤0.16 | Note2 (7) |
| 0.16<DRX-cycle≤2.56 | Note2(5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.5.2.1.2.2-3: Requirement to measure HD-FDD intra-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.13.1 and 9.1.13.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.13.3.

8.5.2.1.1.2.1 Measurement Reporting Requirements

8.5.2.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

#### 8.5.2.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.5.2.1.1.2.1.3.

#### 8.5.2.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ 0}$ defined in Clause 8.5.2.1.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ 0}$ defined in clause 8.5.2.1.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ 0}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.5.2.1.3 E-UTRAN TDD intra frequency measurements

#### 8.5.2.1.3.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within

$$T_{identify\ intra_UE\,cat\,0} = T_{basic\,identify\ E-UTRA_TDD_UE\,cat\,0,\,intra} \cdot \frac{T_{Measurement\ Period_UE\,cat\,0,\,Intra}}{T_{Intra}} \quad ms$$

where

$T_{basic_identify_E\text{-}UTRA_TDD_UE\ cat\ 0,\ intra}$ is 1000 ms

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.13.1 and 9.1.13.2 and RSRQ related side conditions given in Clause 9.1.13.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band

For category 1bis UE, a cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.7 and 9.1.2.8 and RSRQ related side conditions given in Clause 9.1.5.5 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

$T_{Intra}$ : This is the minimum time that is available for intra frequency measurements, during the measurement period with an arbitrarily chosen timing. Time is assumed to be available for performing intra frequency measurements whenever the receiver is guaranteed to be active on the intra frequency carrier.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_UE\ cat\ 0\ Intra}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 400 ms. When no measurement gaps are activated, the UE shall be capable of performing RSRP and RSRQ measurements for 8 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 400 ms. When measurement gaps are activated the UE shall be capable of performing measurements for at least $Y_{measurement\ intra_UE\ cat\ 0}$ cells , where $Y_{measurement\ intra_UE\ cat\ 0}$ is defined in the following equation. If the UE has identified more than $Y_{measurement\ ,intra_UE\ cat\ 0}$ cells, the UE shall perform measurements of at least 8 identified intra-frequency cells but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{measurement\ \ intra_UE\ cat\ 0} = Floor\left\{ X_{basic\ measurement\ TDD_UE\ cat\ 0} \cdot \frac{T_{Intra}}{T_{Measurement_Period_UE\ cat\ 0,\ Intra}} \right\}$$

cells where

$X_{basic\ measurement\ TDD_UE\ cat\ 0}$ = 8 (cells)

$T_{Measurement_Period\ intra_UE\ cat\ 0}$ = 400 ms. The measurement period for Intra frequency RSRP and RSRQ measurements.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.13.1 and 9.1.13.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.13.3.

For category 1bis UE, the RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.7 and 9.1.2.8, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.5.

#### 8.5.2.1.3.1.1 Measurement Reporting Requirements

##### 8.5.2.1.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

##### 8.5.2.1.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.5.2.1.3.1.1.3.

##### 8.5.2.1.3.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ 0}$ defined in Clause 8.5.2.1.3.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ 0}$ defined in clause 8.5.2.1.3.1 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Intra_UE\ cat\ 0}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.5.2.1.3.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.3.2-1. When eDRX_CONN is in use the UE shall be able to identify a new detectable TDD intra-frequency cell within $T_{identify_intra_UE\ cat\ 0}$ as defined in table 8.5.2.1.3.2-1A.

**Table 8.5.2.1.3.2-1: Requirement to identify a newly detectable TDD intrafrequency cell**

| DRX cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 1 (Note1) |
| 0.04<DRX-cycle≤0.08 | Note2 (40) |
| 0.128 | 3.2 (25) |
| 0.128<DRX-cycle≤2.56 | Note2(20) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

**Table 8.5.2.1.3.2-1A: Requirement to identify a newly detectable TDD intra-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (20) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.13.1 and 9.1.13.2 and RSRQ related side conditions given in Clause 9.1.13.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band

For category 1bis UE, a cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.2.7 and 9.1.2.8 and RSRQ related side conditions given in Clause 9.1.5.5 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band.

When DRX is in use in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ 0}$ as shown in table 8.5.2.1.3.2-2. When eDRX_CONN in the RRC_CONNECTED state is in use, the measurement period for intra-frequency measurements is $T_{measure_intra_UE\ cat\ 0}$ as defined in table 8.5.2.1.3.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 8 identified intra-frequency cells and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ 0}$.

**Table 8.5.2.1.3.2-2: Requirement to measure TDD intra frequency cells**

| DRX cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (DRX cycles) |
|---|---|
| ≤0.08 | 0.4 (Note1) |
| 0.08<DRX-cycle≤2.56 | Note2 (5) |

Note1: Number of DRX cycle depends upon the DRX cycle in use.

Note2: Time depends upon the DRX cycle in use.

**Table 8.5.2.1.3.2-3: Requirement to measure TDD intra-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ 0}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5) |
| Note: Time depends upon the eDRX_CONN cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.13.1 and 9.1.13.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.13.3.

For category 1bis UE, the RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.2.7 and 9.1.2.8, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.5.5.

#### 8.5.2.1.3.2.1 Measurement Reporting Requirements

##### 8.5.2.1.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

##### 8.5.2.1.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.5.2.1.3.2.1.3.

##### 8.5.2.1.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.13.1, 9.1.13.2 and 9.1.13.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ 0}$ defined in Clause 8.5.2.1.3.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ 0}$ defined in clause 8.5.2.1.3.2 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ 0}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.5.2.1.4 E-UTRAN FDD intra frequency measurements with autonomous gaps for UE category 0

The requirements defined in this subclause 8.5.2.1.4 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.

##### 8.5.2.1.4.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1 message according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_LC\text{-}UE,intra} = T_{basic_identify_CGI_LC\text{-}UE,intra} \quad ms$$

Where

$T_{basic_identify_CGI_LC\text{-}UE,\ intra}$ = 190 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_LC\text{-}UE,.intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_LC\text{-}UE,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall transmit at least 92 ACK/NACKs on PCell provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

##### 8.5.2.1.4.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

#### 8.5.2.1.5 E-UTRAN intra frequency measurements with autonomous gaps for HD-FDD UE category 0

The requirements in this section are applicable for the UE which supports half duplex FDD operation on one or more supported frequency bands [2].

The requirements defined in this subclause 8.5.2.1.5 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.

#### 8.5.2.1.5.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

All the CGI requirements with the exception of requirement on the number of ACK/NACK transmission on PCell defined in clause 8.5.2.1.4.1 also apply for this section.

For the UE supporting half duplex FDD operation there is no requirement in terms of number of ACK/NACK transmission on PCell.

#### 8.5.2.1.5.2 ECGI Reporting Delay

The ECGI reporting delay defined in clause 8.5.2.1.4.2 also apply for this section.

### 8.5.2.1.6 E-UTRAN TDD intra frequency measurements with autonomous gaps for UE category 0

The requirements defined in this subclause 8.5.2.1.6 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.

#### 8.5.2.1.6.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1 messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_LC\text{-}UE,intra} = T_{basic_identify_CGI_LC\text{-}UE,intra} \quad ms$$

Where

$T_{basic_identify_CGI_LC\text{-}UE,\ intra}$ = 190 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable when the following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_LC\text{-}UE,\ intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_LC\text{-}UE,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the UE shall be able to transmit at least the number of ACK/NACKs stated in Table 8.5.2.1.6.1-1 on PCell provided that:

- there is continuous DL data allocation,
- no DRX and no eDRX_CONN cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured in the PCell or each of activated SCell(s).

**Table 8.5.2.1.6.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{basic_identify_CGI_LC\text{-}UE,\ intra}$.**

| UL/DL configuration | Minimum number of transmitted ACK/NACKs |
|---|---|
| 0 | 30 |
| 1 | 54 |
| 2 | 68 |
| 3 | 56 |
| 4 | 61 |
| 5 | 66 |
| 6 | 46 |

#### 8.5.2.1.6.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

# 8.6 Discovery signal measurements

## 8.6.1 Introduction

This clause contains requirements on the UE for measurement reporting in RRC_CONNECTED state when discovery signal [16] is configured. The requirements are specified for E-UTRA CRS based discovery signal measurements and CSI-RS based discovery signal measurements. These measurements may be used by the E-UTRAN, e.g. for handover decisions. The measurement quantities are defined in [4], the measurement model is defined in [22] and measurement accuracy requirements are specified in clause 9. Control of measurement reporting is specified in TS 36.331 [2].

The requirements in Section 9 are applicable for a UE performing measurements according to Section 8.6.

## 8.6.2 Requirements for CRS based discovery signal measurements

### 8.6.2.1 E-UTRAN intra frequency measurements

The UE shall be able to identify new intra-frequency cells and perform measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency cells and additionally search for and identify new intra frequency cells.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or PRACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.6.2.1 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CRS based discovery signal as specified in section 8.6.2.1 are available for measurements at the UE in the measurement cell.

#### 8.6.2.1.1 E-UTRAN FDD intra frequency measurements

##### 8.6.2.1.1.1 E-UTRAN FDD intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_SCE}$,

$T_{identify_intra_SCE} = 12 * T_{DMTC_periodicity} + T_{Measurement_Period_intra_FDD_CRS}$

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.2 and RSRQ related side conditions given in Clause 9.1.14.4 are fulfilled for a corresponding Band,

- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period\ _intra_FDD_CRS}$ is the intra-frequency period for measurements as shown in table 8.6.2.1.1.1-1

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ intra_FDD_CRS}$ when no DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_FDD_CRS}$ as shown in table 8.6.2.1.1.1-1, when no DRX is in use. The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_FDD_\ CRS}$

**Table 8.6.2.1.1.1-1: Requirement to measure FDD intra frequency cell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_FDD_CRS}$[ms] |
|---|---|---|
| ≥6 | ≥1 | 5 * $T_{DMTC_periodicity}$ |
| ≥25 | ≥1 | 3 * $T_{DMTC_periodicity}$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.1.1.1.1 Measurement Reporting Requirements

##### 8.6.2.1.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

##### 8.6.2.1.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.1.1.1.1.3.

##### 8.6.2.1.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_SCE}$ defined in Clause 8.6.2.1.1.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_SCE}$ defined in clause 8.6.2.1.1.1 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_FDD_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.2.1.1.2 E-UTRAN FDD intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_SCE_DRX}$.

$T_{identify_intra_SCE_DRX} = 16 * Max \{ T_{DMTC_periodicity}, \text{DRX cycle length}\} + T_{Measurement_Period_intra_FDD_CRS_DRX}$

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.2 and RSRQ related side conditions given in Clause 9.1.14.4 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period_intra_FDD_CRS_DRX}$ is the intra-frequency period for measurements as shown in table 8.6.2.1.1.2-1

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ intra_FDD_CRS_DRX}$ when DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period_intra_FDD_CRS_DRX}$ as shown in table 8.6.2.1.1.2-1, when DRX is in use. The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period_intra_FDD_CRS_DRX}$.

**Table 8.6.2.1.1.2-1: Requirement to measure FDD intra frequency cell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_FDD_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥1 | 5 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length } |
| ≥25 | ≥1 | 3 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length } |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.1.1.2.1 Measurement Reporting Requirements

##### 8.6.2.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

##### 8.6.2.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.1.1.2.1.3.

##### 8.6.2.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay

uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_SCE_DRX}$ defined in Clause 8.6.2.1.1.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_SCE_DRX}$ defined in clause 8.6.2.1.1.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_FDD_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.2.1.2 E-UTRAN TDD intra frequency measurements

#### 8.6.2.1.2.1 E-UTRAN TDD intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_SCE}$,

$T_{identify_intra_SCE} = 12 * T_{DMTC_periodicity} + T_{Measurement_Period\ _intra_TDD_CRS}$

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.2 and RSRQ related side conditions given in Clause 9.1.14.4 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period\ _intra_TDD_CRS}$ is the intra-frequency period for measurements

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ _intra_TDD_CRS}$ when no DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_TDD_CRS}$ as shown in table 8.6.2.1.2.1-1, when no DRX is in use. The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_TDD_\ CRS}$

**Table 8.6.2.1.2.1-1: Requirement to measure TDD intra frequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_TDD_CRS}$[ms] |
|---|---|---|
| ≥6 | ≥2 | 5 * $T_{DMTC_periodicity}$ |
| ≥25 | ≥2 | 3 * $T_{DMTC_periodicity}$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.1.2.1.1 Measurement Reporting Requirements

##### 8.6.2.1.2.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

#### 8.6.2.1.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.1.2.1.1.3.

#### 8.6.2.1.2.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_SCE}$ defined in Clause 8.6.2.1.2.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_SCE}$ defined in clause 8.6.2.1.2.1 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_TDD_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.2.1.2.2 E-UTRAN TDD intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_SCE_DRX}$.

$T_{identify_intra_SCE_DRX}$ = 16* max { $T_{DMTC_periodicity}$, DRX cycle length}+ $T_{Measurement_Period\ _intra_TDD_CRS_DRX}$

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.2 and RSRQ related side conditions given in Clause 9.1.14.4 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ intra_TDD_\ CRS_DRX}$ when DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_TDD_CRS_DRX}$ as shown in table 8.6.2.1.2.2-1, when DRX is in use. The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_TDD_\ CRS_DRX}$

**Table 8.6.2.1.2.2-1: Requirement to measure TDD intra frequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_TDD_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥2 | 5 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length } |

| | | |
|---|---|---|
| ≥25 | ≥2 | 3 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length } |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.1.2.2.1 Measurement Reporting Requirements

##### 8.6.2.1.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

##### 8.6.2.1.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.1.2.2.1.3.

##### 8.6.2.1.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_SCE_DRX}$ defined in Clause 8.6.2.1.2.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_SCE_DRX}$ defined in clause 8.6.2.1.2.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_intra_TDD_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.2.2 E-UTRAN inter frequency measurements

The UE shall be able to identify new inter-frequency cells and perform RSRP and RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided. The discovery signal occasion and the measurement gap should be aligned, provided that also the following additional conditions are fulfilled:

Entire discovery signal occasion should be contained in the measurement gap.

The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or PRACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.6.2.2 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CRS based discovery signal as specified in section 8.6.2.2 are available for measurements at the UE in the measurement cell.

### 8.6.2.2.1 E-UTRAN FDD – FDD inter-frequency measurements

#### 8.6.2.2.1.1 E-UTRAN FDD – FDD inter frequency measurements when no DRX is used

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter_SCE}$ according to the following expression:

$T_{Identify_Inter_SCE} = 13 * Max \{T_{DMTC_periodicity}, MGRP\} * N_{freq} + T_{Measurement_Period_inter_FDD_CRS}$

A cell shall be considered detectable provided following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1.14.2 and RSRQ related side conditions given in Sections 9.1.14.4 are fulfilled.

- $SCH_RP|_{dBm}$ SCH Ês/Iot according to Annex B.2.11 for a corresponding Band,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period_intra_FDD_CRS}$ is the inter-frequency period for measurements as shown in table 8.6.2.2.1.1-1. $N_{freq}$ is defined in clause 8.1.2.1.1.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.2 and 9.1.14.4, respectively, with measurement period given by table 8.6.2.2.1.1-1.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.6.2.2.1.1-1 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.2.2.1.1-1: Requirement to measure FDD inter frequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_FDD_CRS}$ [ms] |
|---|---|---|
| ≤6 | ≥1 | 5 * *Max*{ $T_{DMTC_periodicity}$, MGRP}*$N_{freq}$ |
| ≥25 | ≥1 | 3 * *Max*{ $T_{DMTC_periodicity}$, MGRP}*$N_{freq}$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.2.1.1.1 Measurement Reporting Requirements

##### 8.6.2.2.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4,respectively.

##### 8.6.2.2.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.2.1.1.1.3.

#### 8.6.2.2.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify_Inter_SCE}$ defined in Clause 8.6.2.2.1.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify_Inter_SCE}$ defined in clause 8.6.2.2.1.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_inter_FDD_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.2.2.1.2 E-UTRAN FDD – FDD inter frequency measurements when DRX is used

When DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN FDD inter frequency cell within $T_{identify_inter_SCE_DRX}$.

$T_{identify_inter_SCE\ DRX} = 17 * Max \{ T_{DMTC_periodicity}, \text{DRX cycle length}, MGRP\} * N_{freq} + T_{Measurement_Period_inter_FDD_CRS_DRX}$

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.2 and RSRQ related side conditions given in Clause 9.1.14.4 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period_inter_FDD_CRS_DRX}$ is the inter-frequency period for measurements as shown in Table 8.6.2.2.1.2-1. $N_{freq}$ is defined in clause 8.1.2.1.1.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_inter_FDD_CRS_DRX}$ when DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.6.2.2.1.2-1 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.2.2.1.2-1: Requirement to measure FDD interfrequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_FDD_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥1 | 5 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length,MGRP}*$N_{freq}$ |
| ≥25 | ≥1 | 3 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length,MGRP}*$N_{freq}$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.2.1.2.1 Measurement Reporting Requirements

##### 8.6.2.2.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4 respectively.

##### 8.6.2.2.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2 and 9.1.14.4 respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.2.1.2.1.3.

##### 8.6.2.2.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4 respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_SCE\ DRX}$ defined in Clause 8.6.2.2.1.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_SCE\ DRX}$ defined in clause 8.6.2.2.1.2 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_inter_FDD_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.2.2.2 E-UTRAN TDD – TDD inter frequency measurements

#### 8.6.2.2.2.1 E-UTRAN TDD – TDD inter frequency measurements when no DRX is used

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new TDD inter-frequency within $T_{Identify_Inter_SCE}$ according to the following expression:

$T_{identify_inter_SCE} = 13 * Max\ \{ T_{DMTC_periodicity}, MGRP\} * N_{freq} + T_{Measurement_Period_inter_TDD_CRS}$

A cell shall be considered detectable provided following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1.14.2 and RSRQ related side conditions given in Sections 9.1.14.4 are fulfilled.
- SCH_RP$|_{dBm}$ and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period_inter_TDD_CRS}$ is the inter-frequency period for measurements as shown in Table 8.6.2.2.2.1-1. $N_{freq}$ is defined in clause 8.1.2.1.1.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.2, and 9.1.14.4, respectively, with measurement period $T_{Measurement_Period\ inter_TDD_CRS}$ given by table 8.6.2.2.2.1-1:

**Table 8.6.2.2.2.1-1: Requirement to measure TDD interfrequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_TDD_CRS}$ [ms] |
|---|---|---|
| ≥6 | ≥2 | 5 * *Max*{ $T_{DMTC_periodicity}$, MGRP}*$N_{freq}$ |
| ≥25 | ≥2 | 3 * *Max*{ $T_{DMTC_periodicity}$, MGRP}*$N_{freq}$ |

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per TDD inter-frequency for up to 3TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.6.2.2.2.1-1 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

#### 8.6.2.2.2.1.1 Measurement Reporting Requirements

##### 8.6.2.2.2.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

##### 8.6.2.2.2.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.2.2.1.1.3.

##### 8.6.2.2.2.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify_Inter}$ defined in clause 8.6.2.2.2.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify_Inter_SCE}$ defined in clause 8.6.2.2.2.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ inter_TDD_CRS}$ defined in clause 8.6.2.2.2.1 provided the timing to that cell has not changed more than ± 50 Ts while measurementgap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.2.2.2.2 E-UTRAN TDD – TDD inter frequency measurements when DRX is used

When DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN TDD inter frequency cell within $T_{identify_inter_SCE_DRX}$

$T_{identify_inter_SCE_DRX}$ = 17 * *Max* { $T_{DMTC_periodicity}$, DRX cycle length, MGRP} *$N_{freq}$ +$T_{Measurement_Period_inter_TDD_CRS_DRX}$

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.14.2 and RSRQ related side conditions given in Sections 9.1.14.4 are fulfilled.
- SCH_RP|$_{dBm}$ and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

$T_{Measurement_Period_inter_TDD_CRS_DRX}$ is the inter-frequency period for measurements as shown in Table 8.6.2.2.2.2-1. $N_{freq}$ is defined in clause 8.1.2.1.1.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period\ intra_TDD_CRS_DRX}$ when DRX is used. If higher layer filtering is used, an additional cell identification delay can be expected.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.6.2.2.2.2-1 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.2.2.2.2-1: Requirement to measure TDD interfrequency cell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_TDD_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥2 | 5 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length,MGRP}*$N_{freq}$ |
| ≥25 | ≥2 | 3 * *Max*{ $T_{DMTC_periodicity}$, DRX cycle length,MGRP}*$N_{freq}$ |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.14.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.14.4.

#### 8.6.2.2.2.2.1 Measurement Reporting Requirements

##### 8.6.2.2.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

##### 8.6.2.2.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.2.2.2.2.1.3.

##### 8.6.2.2.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.2, and 9.1.14.4, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that

the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify_Inter}$ defined in clause 8.6.2.2.2.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_SCE_DRX}$ defined in clause 8.6.2.2.2.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_inter_TDD_CRS_DRX}$ defined in clause 8.6.2.2.2.2 provided the timing to that cell has not changed more than ± 50 Ts while measurementgap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.2.2.3 E-UTRAN TDD – FDD inter frequency measurements

##### 8.6.2.2.3.1 E-UTRAN TDD – FDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.2.2.1.1 also apply for this section.

##### 8.6.2.2.3.2 E-UTRAN TDD – FDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.2.2.1.2 also apply for this section.

#### 8.6.2.2.4 E-UTRAN FDD – TDD inter frequency measurements

##### 8.6.2.2.4.1 E-UTRAN FDD – TDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.2.2.2.1 also apply for this section.

##### 8.6.2.2.4.2 E-UTRAN FDD – TDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.2.2.2.2 also apply for this section.

## 8.6.3 Requirements for CSI-RS based discovery signal measurements

### 8.6.3.1 E-UTRAN intra frequency measurements

The UE shall be able to identify new intra-frequency TPs and perform CSI-RSRP measurements of intra-frequency TPs with an explicit intra-frequency TP list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency TPs and additionally search for and identify new intra frequency TPs.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.6.3.1 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CSI-RS based discovery signal as specified in section 8.6.3.1 is available for measurements at the UE in the measurement cell.

### 8.6.3.1.1 E-UTRAN FDD intra frequency measurements

#### 8.6.3.1.1.1 E-UTRAN FDD intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD intra frequency TP within $T_{identify_intra_TP_SCE}$,

$T_{identify_intra_TP_SCE} = T_{identify_intra_SCE} + T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_intra_SCE}$ is the intra-frequency period for cell identification in section 8.6.2.1.1.1. $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS}$ is the intra-frequency period for TP measurement as shown in table 8.6.3.1.1.1-1.

Identification of a TP shall include identification of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_intra_FDD_CSI\text{-}RS}$ when no DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period_intra_FDD_CSI\text{-}RS}$ as shown in table 8.6.3.1.1.1-1, when no DRX is in use. The UE shall be capable of performing CSI-RSRP measurements for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period_intra_FDD_CSI\text{-}RS}$

**Table 8.6.3.1.1.1-1: Requirement to measure FDD intra frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | 5* $T_{DMTC_periodicity}$ |
| ≥ 25 | ≥1 | 3* $T_{DMTC_periodicity}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.1.1.1.1 Measurement Reporting Requirements

##### 8.6.3.1.1.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

##### 8.6.3.1.1.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.1.1.1.1.3.

##### 8.6.3.1.1.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is

transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_SCE}$ defined in Clause 8.6.3.1.1.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_SCE}$ defined in clause 8.6.3.1.1.1 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS}$ provided the timing to that TP has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.3.1.1.2 E-UTRAN FDD intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency TP within $T_{identify_intra_TP_SCE_DRX}$.

$T_{identify_intra_TP_SCE_DRX} = T_{identify_intra_SCE_DRX} + T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS_DRX}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_intra_SCE_DRX}$ is the intra-frequency period for cell identification in section 8.6.2.1.1.2. $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS_DRX}$ is the intra-frequency period for TP measurement as shown in table 8.6.3.1.1.2-1.

Identification of a TP shall include identification of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_intra_FDD_CSI\text{-}RS_DRX}$ when DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS_DRX}$ as shown in table 8.6.3.1.1.2-1, when DRX is in use. The UE shall be capable of performing CSI-RSRP measurements for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_FDD_\ CSI\text{-}RS_DRX}$.

**Table 8.6.3.1.1.2-1: Requirement to measure FDD intra frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_FDD_\ CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | 5**Max*{$T_{DMTC_periodicity}$, DRX cycle length} |
| ≥ 25 | ≥1 | 3**Max*{$T_{DMTC_periodicity}$, DRX cycle length} |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

##### 8.6.3.1.1.2.1 Measurement Reporting Requirements

###### 8.6.3.1.1.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

###### 8.6.3.1.1.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.1.1.2.1.3.

#### 8.6.3.1.1.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_SCE_DRX}$ defined in Clause 8.6.3.1.1.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_SCE_DRX}$ defined in clause 8.6.3.1.1.2 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_FDD_CSI\text{-}RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.3.1.2 E-UTRAN TDD intra frequency measurements

#### 8.6.3.1.2.1 E-UTRAN TDD intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable TDD intra frequency TP within $T_{identify_intra_TP_SCE}$,

$T_{identify_intra_TP_SCE} = T_{identify_intra_SCE} + T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_intra_SCE}$ is the intra-frequency period for cell identification in section 8.6.2.1.2.1. $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS}$ is the intra-frequency period for TP measurement as shown in table 8.6.3.1.2.1-1.

Identification of a TP shall include identification of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_intra_TDD_CSI\text{-}RS}$ when no DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS}$ as shown in table 8.6.3.1.2.1-1, when no DRX is in use. The UE shall be capable of performing measurements for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_TDD_\ CSI\text{-}RS}$

**Table 8.6.3.1.2.1-1: Requirement to measure TDD intra frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | 5* $T_{DMTC_periodicity}$ |
| ≥ 25 | ≥2 | 3* $T_{DMTC_periodicity}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.1.2.1.1 Measurement Reporting Requirements

##### 8.6.3.1.2.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

##### 8.6.3.1.2.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.1.2.1.1.3.

##### 8.6.3.1.2.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_SCE}$ defined in Clause 8.6.3.1.2.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_SCE}$ defined in clause 8.6.3.1.2.1 becomes undetectable for a period $\leq$ 5 seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.3.1.2.2 E-UTRAN TDD intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency TP within $T_{identify_intra_TP_SCE_DRX}$.

$$T_{identify_intra_TP_SCE_DRX} = T_{identify_intra_SCE_DRX} + T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS_DRX}$$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_intra_SCE_DRX}$ is the intra-frequency period for cell identification as shown in section 8.6.2.1.2.2.
$T_{Measurement_Period_intra_TDD_CSI\text{-}RS_DRX}$ is the intra-frequency period for TP measurement as shown in table 8.6.3.1.2.2-1.

Identification of a TP shall include identification of the cell and additionally performing a single measurement with measurement period of $T_{Measurement_Period_intra_TDD_CSI\text{-}RS_DRX}$ when DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS_DRX}$ as shown in table 8.6.3.1.2.2-1, when DRX is in use. The UE shall be capable of performing CSI-

RSRP measurements for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_Period\ _intra_TDD_\ CSI\text{-}RS_DRX}$

**Table 8.6.3.1.2.2-1: Requirement to measure TDD intrafrequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ intra_TDD_\ CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | $5*Max\{T_{DMTC_periodicity}$, DRX cycle length$\}$ |
| ≥ 25 | ≥2 | $3*Max\{T_{DMTC_periodicity}$, DRX cycle length$\}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.1.2.2.1 Measurement Reporting Requirements

##### 8.6.3.1.2.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

##### 8.6.3.1.2.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.1.2.2.1.3.

##### 8.6.3.1.2.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_SCE_DRX}$ defined in Clause 8.6.3.1.2.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_SCE_DRX}$ defined in clause 8.6.3.1.2.2 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _intra_TDD_CSI\text{-}RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.3.2 E-UTRAN inter frequency measurements

The UE shall be able to identify new inter-frequency TPs and perform CSI-RSRP measurements of inter-frequency TP with an explicit inter-frequency TP list containing physical layer cell identities. The discovery signal occasion and the measurement gap should be aligned, provided that also the following additional conditions are fulfilled:

Entire discovery signal occasion should be contained in the measurement gap.

The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.6.3.2 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CSI-RS based discovery signal as specified in section 8.6.3.2 is available for measurements at the UE in the measurement cell.

### 8.6.3.2.1 E-UTRAN FDD – FDD inter frequency measurements

#### 8.6.3.2.1.1 E-UTRAN FDD – FDD inter frequency measurements when no DRX is used

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new FDD inter-frequency TP within $T_{identify_inter_TP_SCE}$ according to the following expression:

$T_{identify_inter_TP_SCE} = T_{identify_Inter_SCE} + T_{Measurement_Period\ _inter_FDD_CSI\text{-}RS}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{identify_inter_SCE}$ is the inter-frequency period for cell identification as shown in section 8.6.2.2.1.1. $N_{freq}$ is defined in clause 8.1.2.1.1. $T_{Measurement_Period\ _inter_FDD_CSI\text{-}RS}$ is the inter-frequency period for TP measurement as shown in table 8.6.3.2.1.1-1.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.3, with measurement period given by table 8.6.3.2.1.1-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TPs per FDD inter-frequency for up to 3 FDD inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with the measurement period defined in table 8.6.3.2.1.1-1 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.3.2.1.1-1: Requirement to measure FDD inter frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_FDD_\ CSI\text{-}RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | $5*Max\{T_{DMTC_periodicity}, MGRP\}*N_{freq}$ |
| ≥ 25 | ≥1 | $3*Max\{T_{DMTC_periodicity}, MGRP\}*N_{freq}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.2.1.1.1 Measurement Reporting Requirements

##### 8.6.3.2.1.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

##### 8.6.3.2.1.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.2.1.1.1.3.

#### 8.6.3.2.1.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_SCE}$ defined in Clause 8.6.3.2.1.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_SCE}$defined in clause 8.6.3.2.1.1 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _inter_FDD_CSI\text{-}RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.3.2.1.2 E-UTRAN FDD – FDD inter frequency measurements when DRX is used

When DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN FDD inter frequency TP within $T_{identify_inter_TP_SCE_DRX}$ according to the following expression:

$T_{identify_inter_TP_SCE_DRX} = T_{identify_inter_SCE_DRX} + T_{Measurement_Period_inter_FDD_CSI\text{-}RS_DRX}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{identify_inter_SCE_DRX}$ is the inter-frequency period for cell identification as shown in section 8.6.2.2.1.2. $N_{freq}$ is defined in clause 8.1.2.1.1. $T_{Measurement_Period_inter_FDD_CSI\text{-}RS_DRX}$ is the inter-frequency period for TP measurement as shown in table 8.6.3.2.1.2-1.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.3, with measurement period given by table 8.6.3.2.1.2-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TPs per FDD inter-frequency for up to 3 FDD inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with the measurement period defined in table 8.6.3.2.1.2-1 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.3.2.1.2-1: Requirement to measure FDD inter frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_FDD_\ CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | 5**Max*{$T_{DMTC_periodicity}$, DRX cycle length, MGRP}*$N_{freq}$ |
| ≥ 25 | ≥1 | 3**Max*{$T_{DMTC_periodicity}$, DRX cycle length, MGRP}*$N_{freq}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.2.1.2.1 Measurement Reporting Requirements

##### 8.6.3.2.1.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3 respectively.

##### 8.6.3.2.1.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.2.1.2.1.3.

##### 8.6.3.2.1.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_SCE_DRX}$ defined in clause 8.6.3.2.1.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_SCE_DRX}$ defined in clause 8.6.3.2.1.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_inter_FDD_CSI\text{-}RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.6.3.2.2 E-UTRAN TDD – TDD inter frequency measurements

#### 8.6.3.2.2.1 E-UTRAN TDD – TDD inter frequency measurements when no DRX is used

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new TDD inter-frequency TP within $T_{identify_inter_TP_SCE}$ according to the following expression:

$T_{identify_inter_TP_SCE} = T_{identify_inter_SCE} + T_{Measurement_Period\ _inter_TDD_CSI\text{-}RS}$

A TP shall be considered detectable when

- CSI-RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{identify_inter_SCE}$ is the inter-frequency period for cell identification as shown in section 8.6.2.2.2.1. $N_{freq}$ is defined in clause 8.1.2.1.1. $T_{Measurement_Period\ _inter_TDD_CSI\text{-}RS}$ is the inter-frequency period for TP measurement as shown in table 8.6.3.2.2.1-1.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP measurements

to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.3, with measurement period given by table 8.6.3.2.2.1-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TP per TDD inter-frequency for up to 3TDD inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with the measurement period defined in table 8.6.3.2.2.1-1 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.3.2.2.1-1: Requirement to measure TDD inter frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_TDD_\ CSI\text{-}RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | $5*Max\{T_{DMTC_periodicity}, MGRP\}*N_{freq}$ |
| ≥ 25 | ≥2 | $3*Max\{T_{DMTC_periodicity}, MGRP\}*N_{freq}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

### 8.6.3.2.2.1.1 Measurement Reporting Requirements

#### 8.6.3.2.2.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

#### 8.6.3.2.2.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.2.2.1.1.3.

#### 8.6.3.2.2.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_SCE}$ defined in clause 8.6.3.2.2.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_SCE}$ defined in clause 8.6.3.2.2.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ _inter_TDD_CSI\text{-}RS}$ provided the timing to that TP has not changed more than ± 50 Ts while measurementgap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.3.2.2.2 E-UTRAN CSI-RS based TDD – TDD inter frequency measurements when DRX is used

When DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN TDD inter frequency TP within $T_{identify_inter_TP_SCE_DRX}$ according to the following expression:

$T_{identify_inter_TP_SCE_DRX} = T_{identify_inter_SCE_DRX} + T_{Measurement_Period\ _inter_TDD_CSI\text{-}RS_DRX}$

A TP shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.14.3 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.11 for a corresponding Band

$T_{identify_inter_SCE_DRX}$ is the inter-frequency period for cell identification as shown in section 8.6.2.2.2.2. $N_{freq}$ is defined in clause 8.1.2.1.1. $T_{Measurement_Period\ _inter_TDD_CSI\text{-}RS_DRX}$ is the inter-frequency period for TP measurement as shown in table 8.6.3.2.2.2-1.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.14.3, with measurement period given by table 8.6.3.2.2.2-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TPs per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with the measurement period defined in table 8.6.3.2.2.2-1 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.6.3.2.2.2-1: Requirement to measure TDD inter frequency TP**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{Measurement_Period\ inter_TDD_\ CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | 5**Max*{$T_{DMTC_periodicity}$, DRX cycle length, MGRP}*$N_{freq}$ |
| ≥ 25 | ≥2 | 3**Max*{$T_{DMTC_periodicity}$, DRX cycle length, MGRP}*$N_{freq}$ |

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in the sub-clauses 9.1.14.3.

#### 8.6.3.2.2.2.1 Measurement Reporting Requirements

##### 8.6.3.2.2.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.14.3.

##### 8.6.3.2.2.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.14.3.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.6.3.2.2.2.1.3.

##### 8.6.3.2.2.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.14.3.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that

the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_SCE_DRX}$ defined in Clause 8.6.3.2.2.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_SCE_DRX}$ in clause 8.6.3.2.2.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_inter_TDD_CSI-RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

#### 8.6.3.2.3 E-UTRAN TDD – FDD inter frequency measurements

##### 8.6.3.2.3.1 E-UTRAN TDD – FDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.3.2.1.1 also apply for this section.

##### 8.6.3.2.3.2 E-UTRAN TDD – FDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.3.2.1.2 also apply for this section.

#### 8.6.3.2.4 E-UTRAN FDD – TDD inter frequency measurements

##### 8.6.3.2.4.1 E-UTRAN FDD – TDD inter frequency measurements when no DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.3.2.2.1 also apply for this section.

##### 8.6.3.2.4.2 E-UTRAN FDD – TDD inter frequency measurements when DRX is used

The requirements in this clause shall apply to UE supporting FDD and TDD.

The requirements in clause 8.6.3.2.2.2 also apply for this section.

## 8.7 Discovery signal measurements for E-UTRA carrier aggregation

### 8.7.1 Introduction

Requirements in this clause are applicable to UE supporting E-UTRA FDD, E-UTRA TDD and/or E-UTRA TDD-FDD carrier aggregation.

Non configured frequencies may be measured with measurement gaps according to the requirements in clause 8.6.2.2 and clause 8.6.3.2 (E-UTRAN CRS based inter frequency measurements and E-UTRAN CSI-RS based inter frequency measurements).

## 8.7.2 Requirements for CRS based discovery signal measurements for E-UTRA carrier aggregation

### 8.7.2.1 Measurements of the primary component carrier

CRS based measurements of cells on the primary component carrier shall meet all applicable requirements (FDD or TDD) in clause 8.6.2.1.

### 8.7.2.2 Measurements of a secondary component carrier

A Secondary component carrier may be activated and deactivated by MAC-CE commands as specified in [17]. The applicable performance requirements depend on whether the SCell on the corresponding frequency is actived or deactivated.

### 8.7.2.3 Measurements of a secondary component carrier with active SCell

When the SCell is activated, measurement performance requirements for the frequency are those given in clause 8.6.2.1. If common DRX is in use, then the requirements for that secondary component carrier are given by the applicable DRX requirements (FDD or TDD) in clause 8.6.2.1 , otherwise the non DRX requirements are applicable. The applicable measurement accuracy requirements are in clause 9.1.15.

### 8.7.2.4 Measurements of a secondary component carrier with deactivated SCell

This clause defines the measurement requirements of a secondary component carrier with deactivated SCell based on the parameter *measCycleSCell* defined in TS 36.331 [2].

#### 8.7.2.4.1 E-UTRAN secondary component carrier measurements when no common DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD or TDD cell on a secondary component carrier within $T_{identify_scc_SCE}$, according to the parameter *measCycleSCell* where $T_{identify_scc_CRS}$ = 13 **measCycleSCell*+ $T_{measure_scc_CRS}$

A cell shall be considered detectable when

- RSRP related side condition given in Clause 9.1.15 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

The measurement period for deactivated scell measurements is $T_{measure_scc_CRS}$ according to the parameter *measCycleSCell* shown in Tables 8.7.2.4.1-1 and 8.7.2.4.1-2.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or PRACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.7.2.4.1 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CRS based discovery signal as specified in section 8.7.2.4.1 are available for measurements at the UE in the measurement cell.

**Table 8.7.2.4.1-1: Requirement to measure intra frequency cell on FDD SCC with deactivated SCell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CRS}$ [ms] |
|---|---|---|
| ≥6 | ≥1 | 5* *measCycleSCell* |
| ≥25 | ≥1 | 3 * *measCycleSCell* |

**Table 8.7.2.4.1-2: Requirement to measure intra frequency cell on TDD SCC with deactivated SCell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CRS}$ [ms] |
|---|---|---|
| ≥6 | ≥2 | 5* *measCycleSCell* |

| | | |
|---|---|---|
| ≥25 | ≥2 | 3 * *measCycleSCell* |

The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc_CRS}$.

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.15.

A UE may reconfigure the receiver bandwidth or turn on/off one of the RF chains when performing measurements on up to six SCCs with deactivated SCell. This may cause interruptions on PCell or activated SCell(s) or both that are specified in Section 7.8.

#### 8.7.2.4.1.1 Measurement Reporting Requirements

##### 8.7.2.4.1.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in clause 9.

##### 8.7.2.4.1.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic CRS based measurement reporting shall meet the requirements specified in clause 8.7.2.4.1.1.3.

##### 8.7.2.4.1.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc_CRS}$ defined in Clause 8.7.2.4.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_scc_SCE}$ defined in clause 8.7.2.4.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc_CRS}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.7.2.4.2 E-UTRAN secondary component carrier measurements when common DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD or TDD cell on a secondary component carrier within $T_{identify_scc}$, according to the parameter *measCycleSCell* where $T_{identify_scc_SCE_DRX}$ = 17**Max*(*measCycleSCell*, DRX cycle length)+$T_{measure_scc_CRS_DRX}$.

A cell shall be considered detectable when

- RSRP related side condition given in Clause 9.1.15 are fulfilled for a corresponding Band,

- SCH_RP|$_{dBm}$ and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

The measurement period for deactivated scell measurements is $T_{measure_scc_CRS_DRX}$ according to the parameter *measCycleSCell* shown in Tables 8.7.2.4.2-1 and 8.7.2.4.2-2.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or PRACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.7.2.4.2 provided the following condition is met:

- -minimum number of configured discovery signal occasions containing CRS based discovery signal as specified in section 8.7.2.4.2 are available for measurements at the UE in the measurement cell.

**Table 8.7.2.4.2-1: Requirement to measure intrafrequency cell on FDD SCC with deactivated SCell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥1 | 5* *Max*{ *measCycleSCell*, DRX cycle length } |
| ≥25 | ≥1 | 3 * *Max*{ *measCycleSCell*, DRX cycle length } |

**Table 8.7.2.4.2-2: Requirement to measure intrafrequency cell on TDD SCC with deactivated SCell**

| Measurement bandwidth[RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CRS_DRX}$ [ms] |
|---|---|---|
| ≥6 | ≥2 | 5* *Max*{ *measCycleSCell*, DRX cycle length } |
| ≥25 | ≥2 | 3 * *Max*{ *measCycleSCell*, DRX cycle length } |

The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc_CRS_DRX}$.

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.15.

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, and when making measurements of cells on up to six SCCs with deactivated SCell. This may cause interruptions (packet drops) to a PCell or activated SCell(s) or both when the PCell and the SCell belong to the same frequency band. No interruptions while the On Duration timer is running shall be allowed when common DRX is used. The requirement considers only interruptions due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

#### 8.7.2.4.2.1 Measurement Reporting Requirements

##### 8.7.2.4.2.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in clause 9.

##### 8.7.2.4.2.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.7.2.4.2.1.3.

##### 8.7.2.4.2.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered CRS based measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc_CRS}$ defined in Clause 8.7.2.4.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_scc_SCE_DRX}$ defined in clause 8.7.2.4.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

## 8.7.3 Requirements for CSI-RS based discovery signal measurements for E-UTRA carrier aggregation

### 8.7.3.1 Measurements of the primary component carrier

Measurements of cells on the primary component carrier shall meet all applicable requirements (FDD or TDD) in clause 8.6.3.1.

### 8.7.3.2 Measurements of a secondary component carrier

A Secondary component carrier may be activated and deactivated by MAC-CE commands as specified in [17]. The applicable performance requirements depend on whether the SCell on the corresponding frequency is actived or deactivated.

### 8.7.3.3 Measurements of a secondary component carrier with active SCell

When the SCell is activated, measurement performance requirements for the frequency are those given in clause 8.6.3.1. If common DRX is in use, then the requirements for that secondary component carrier are given by the applicable DRX requirements (FDD or TDD) in clause 8.6.3.1 , otherwise the non DRX requirements are applicable. The applicable measurement accuracy requirements are in clause 9.1.15.

### 8.7.3.4 Measurements of a secondary component carrier with deactivated SCell

This clause defines the measurement requirements of a secondary component carrier with deactivated SCell based on the parameter *measCycleSCell* defined in TS 36.331 [2].

#### 8.7.3.4.1 E-UTRAN secondary component carrier measurements when no common DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FDD or TDD TP on a secondary component carrier within $T_{identify_scc_TP_SCE}$, according to the parameter *measCycleSCell*, where $T_{identify_scc_TP_SCE} = T_{identify_scc_SCE} + T_{measure_scc_CSI\text{-}RS}$,

A cell shall be considered detectable when

- CSI-RSRP related side condition given in Clause 9.1.15 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_scc_SCE}$ is the intra-frequency period for cell identification in section 8.7.2.4.1. $T_{measure_scc_CSI\text{-}RS}$ is the intra-frequency period for TP measurement in table 8.7.3.4.1-1.

The measurement period for deactivated scell measurements is $T_{measure_scc_CSI\text{-}RS}$ according to the parameter *measCycleSCell* as shown in tables 8.7.3.4.1-1 and 8.7.3.4.1-2.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.7.3.4.1 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CSI-RS based discovery signal as specified in section 8.7.3.4.1 is available for measurements at the UE in the measurement cell.

**Table 8.7.3.4.1-1: Requirement to measure intra frequency TP on FDD SCC with deactivated SCell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CSI-RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | 5* *measCycleSCell* |
| ≥ 25 | ≥1 | 3* *measCycleSCell* |

**Table 8.7.3.4.1-2: Requirement to measure intra frequency TP on TDD SCC with deactivated SCell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CSI-RS}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | 5* *measCycleSCell* |
| ≥ 25 | ≥2 | 3* *measCycleSCell* |

The UE shall be capable of performing RSRP measurements for 3 identified TPs on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc_CSI-RS}$.

The measurement accuracy for all measured TPs shall be as specified in the sub-clause 9.1.15.

A UE may reconfigure the receiver bandwidth or turn on/off one of the RF chains when performing measurements on up to six SCCs with deactivated SCell. This may cause interruptions on PCell or activated SCell(s) or both that are specified in Section 7.8.

#### 8.7.3.4.1.1 Measurement Reporting Requirements

##### 8.7.3.4.1.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in clause 9.

##### 8.7.3.4.1.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.7.3.4.1.1.3.

##### 8.7.3.4.1.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc_TP_SCE}$ defined in Clause 8.7.3.4.1. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_scc_TP_SCE}$ defined in clause 8.7.3.4.1 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc_CSI-RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.7.3.4.2 E-UTRAN secondary component carrier measurements when common DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD or TDD TP on a secondary component carrier within $T_{identify_scc_TP_SCE_DRX}$, according to the parameter *measCycleSCell*, where $T_{identify_scc_TP_SC\ E_DRX} = T_{identify_scc_SCE_DRX} + T_{measure_scc_CSI-RS_DRX}$,

A cell shall be considered detectable when

- CSI-RSRP related side condition given in Clause 9.1.15 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.10 for a corresponding Band

$T_{identify_scc_SCE_DRX}$ is the intra-frequency period for cell identification in section 8.7.2.4.2. $T_{measure_scc_CSI-RS_DRX}$ is the intra-frequency period for TP measurement in table 8.7.3.4.2-1.

The measurement period for deactivated scell measurements is $T_{measure_scc_CSI-RS_DRX}$ according to the parameter *measCycleSCell* as shown in tables 8.7.3.4.2-1 and 8.7.3.4.2-2.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.7.3.4.2 provided the following condition is met:

- minimum number of configured discovery signal occasions containing CSI-RS based discovery signal as specified in section 8.7.3.4.2 is available for measurements at the UE in the measurement cell.

**Table 8.7.3.4.2-1: Requirement to measure intrafrequency TP on FDD SCC with deactivated SCell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CSI-RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥1 | 5* max {*measCycleSCell*, DRX cycle length } |
| ≥ 25 | ≥1 | 3* max {*measCycleSCell*, DRX cycle length } |

**Table 8.7.3.4.2-2: Requirement to measure intrafrequency TP on TDD SCC with deactivated SCell**

| Measurement bandwidth [RB] | Discovery signal occasion duration (*ds-OccasionDuration*) [ms] | $T_{measure_scc_CSI-RS_DRX}$ [ms] |
|---|---|---|
| ≥ 6 | ≥2 | 5* max {*measCycleSCell*, DRX cycle length } |
| ≥ 25 | ≥2 | 3* max {*measCycleSCell*, DRX cycle length } |

The UE shall be capable of performing CSI-RSRP measurements for 3 identified TPs on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_scc_CSI-RS_DRX}$.

The measurement accuracy for all measured TPs shall be as specified in the sub-clause 9.1.15.

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, and when making measurements of TPs on up to six SCCs with deactivated SCell. This may cause interruptions (packet drops) to a PCell or activated SCell(s) or both when the PCell and the SCell belong to the same frequency band. No interruptions while the On Duration timer is running shall be allowed when common DRX is used. The requirement considers only interruptions due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

#### 8.7.3.4.2.1 Measurement Reporting Requirements

##### 8.7.3.4.2.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in clause 9.

##### 8.7.3.4.2.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.7.3.4.2.1.3.

##### 8.7.3.4.2.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$ where $TTI_{DCCH}$ is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_scc_TP_SCE_DRX}$ defined in Clause 8.7.3.4.2. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_scc_TP_SCE_DRX}$ defined in clause 8.7.3.4.2 becomes undetectable for a period $\leq 5$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_scc_CSI-RS_DRX}$ provided the timing to that TP has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

# 8.8 Measurements for E-UTRA dual connectivity

## 8.8.1 Introduction

This clause contains requirements for UE supporting E-UTRA dual connectivity. Requirements in this clause are applicable to UEs which have been configured with one SCell in either MCG or SCG and one PSCell for inter-band dual connectivity. Requirements in this clause are applicable to E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD dual connectivity.

The UE capable of SRS carrier based switching when configured to perform SRS transmission and/or RACH transmission over one or more SCells without PUSCH shall meet the requirements defined in Section 8.8 provided the following condition is met:

- at least DL subframe #0 or DL subframe #5 per radio frame is available for measurements at the UE in the measurement cell.

## 8.8.2 Intra-frequency measurements requirements on PCell

PCell intra-frequency measurements shall meet all applicable requirements in clause 8.1.2.2. If MCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the MCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

## 8.8.3 Intra-frequency measurements requirements on PSCell

PSCell starts with activated state upon configuration and cannot be deactivated. PSCell intra-frequency measurements shall meet all applicable requirements in clause 8.1.2.2. If SCG DRX is in use, then the PSCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

## 8.8.4 Inter-frequency and inter-RAT measurement requirements

Inter-frequency measurements shall meet all applicable requirements in clause 8.1.2.3. If MCG DRX is in use, then the inter-frequency requirements for when DRX is in use in clause 8.1.2.3 shall apply and shall depend on the MCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

Inter-RAT measurements shall meet all applicable requirements in clause 8.1.2.4. If MCG DRX is in use, then the inter-RAT requirements for when DRX is in use in clause 8.1.2.4 shall apply and shall depend on the MCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.2, 9.3, 9.4 and 9.5.

## 8.8.5 Intra-frequency measurements with autonomous gaps

### 8.8.5.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose ‘reportCGI’. The UE may make autonomous gaps in both MCG and SCG in downlink reception and uplink transmission for receiving MIB and SIB1 messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of ‘reportCGI’, regardless of whether DRX is used or whether the SCell is configured, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,intra} = T_{basic_identify_CGI,intra}\ ms$$

where

$T_{basic_identify_CGI,\ intra}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided that the PBCH demodulation requirements in [5] are met.

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,.intra}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 36.331 [2] is used.

Within the time $T_{identify_CGI,intra}$ ms, over which the UE identifies the CGI of a new E-UTRA cell, the UE shall transmit at least a minimum number of ACK/NACKs on cells in MCG and SCG, respectively, as specified in Table 8.8.5.1-1. The requirement depends on duplex mode, dual connectivity mode of operation, and whether a cell belongs to MCG or SCG, and is further conditioned on:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,

- no MBSFN subframes are configured.

**Table 8.8.5.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{identify_CGI,\ intra}$.**

| Serving cell configuration | Minimum number of transmitted ACK/NACKs | | | |
|---|---|---|---|---|
| | Synchronous operation | | Asynchronous operation | |
| | MCG | SCG | MCG | SCG |
| FDD | 60 | | 60 | 49 |
| TDD UL/DL configuration 0 | 18 | | N/A | N/A |
| TDD UL/DL configuration 1 | 35 | | N/A | N/A |
| TDD UL/DL configuration 2 | 43 | | N/A | N/A |
| TDD UL/DL configuration 3 | 36 | | N/A | N/A |
| TDD UL/DL configuration 4 | 39 | | N/A | N/A |
| TDD UL/DL configuration 5 | 42 | | N/A | N/A |
| TDD UL/DL configuration 6 | 30 | | N/A | N/A |

### 8.8.5.2 ECGI reporting delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. If IDC autonomous denial is configured, an additional delay can be expected.

## 8.8.6 Inter-frequency measurements with autonomous gaps

### 8.8.6.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in both MCG and SCG in downlink reception and uplink transmission for receiving MIB and SIB1 messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX is used or whether the SCell is configured, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI,inter} = T_{basic_identify_CGI,inter}\ ms$$

where

$T_{basic_identify_CGI,\ inter}$ = 150 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.2 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided that the PBCH demodulation requirements in [5] are met.

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI,.inter}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 36.331 [2] is used.

Within the time $T_{identify_CGI,inter}$ ms, over which the UE identifies the CGI of a new E-UTRA cell, the UE shall transmit at least a minimum number of ACK/NACKs on cells in MCG and SCG, respectively, as specified in Table 8.8.6.1-1. The requirement depends on duplex mode, dual connectivity mode of operation, and whether a cell belongs to MCG or SCG, and is further conditioned on:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each subframe,
- no MBSFN subframes are configured.

**Table 8.8.6.1-1: Requirement on minimum number of ACK/NACKs to transmit during $T_{identify_CGI,\ inter}$.**

| Serving cell configuration | Minimum number of transmitted ACK/NACKs | | | |
|---|---|---|---|---|
| | Synchronous operation | | Asynchronous operation | |
| | MCG | SCG | MCG | SCG |
| FDD | 60 | | 60 | 49 |
| TDD UL/DL configuration 0 | 18 | | N/A | N/A |
| TDD UL/DL configuration 1 | 30 | | N/A | N/A |

### 8.8.6.2 ECGI reporting delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. If IDC autonomous denial is configured, an additional delay can be expected.

## 8.8.7 SSTD Measurements

### 8.8.7.1 Introduction

This clause contains SSTD measurement requirements on UE capabilities for support of E-UTRA dual connectivity.

### 8.8.7.2 SSTD Measurement requirements

When no DRX is used the physical layer measurement period of the SSTD measurement shall be $T_{measure_SSTD1}$ = 200 ms.

When either MCG DRX or SCG DRX is used, or both MCG DRX and SCG DRX are used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_SSTD1}$) of the SSTD measurement shall be as specified in table 8.8.7.2-1.

**Table 8.8.7.2-1: SSTD measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_SSTD1}$ (s) (DRX cycles) |
|---|---|
| ≤0.04 | 0.2 (Note1) |
| 0.04<DRX-cycle≤2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use<br>Note3: DRX cycle length in this table refers to the DRX cycle length configured on the CG in which DRX is used. When DRX is used in both MCG and SCG, DRX cycle length in this table refers to the longer DRX cycle length between MCG DRX and SCG DRX. | |

If PCell is changed without changing PCC, and/or if PSCell is changed without changing a frequency of PSCell or if both PCell and PSCell are change by swapping the PCC with the frequency of PSCell while the UE is performing SSTD measurements, then the UE shall also meet the SSTD measurement and accuracy requirements corresponding to the new PCell and/or PSCell. However in this case the UE shall restart the SSTD measurement. In this case the total physical layer measurement period of the SSTD measurement shall not exceed $T_{measure_SSTD2}$ as defined in the following expression:

$$T_{measure_SSTD2} = (N+M+1)*(T_{measure_SSTD1}) + N*T_{PCell_change_DC} + M*T_{PSCell_change_DC}$$

Where:

N is the number of times the PCell is changed over the measurement period ($T_{measure_SSTD2}$),

M is the number of times the PSCell is changed over the measurement period ($T_{measure_SSTD2}$),

$T_{PCell_change_DC}$ is the time necessary to change the PCell; it can be up to 25 ms,

$T_{PSCell_change_DC}$ is the time necessary to change the PSCell; it can be up to 25 ms.

The measurement accuracy for the SSTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.20.

#### 8.8.7.3 SSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in sub-clause 9.1.20.

### 8.8.8 Intra-frequency measurements requirements on SCell

SCell intra-frequency measurements shall meet all applicable requirements in clause 8.3.3. In case where the SCell belongs to MCG, the term “common DRX” in clause 8.3.3 shall be deemed to be replaced with “MCG DRX”. In case where the SCell belongs to SCG, the term “common DRX” and PCell in clause 8.3.3 shall be replaced with “SCG DRX” and PSCell, respectively.

## 8.9 MBSFN Measurements

### 8.9.1 Introduction

The requirements specified in Section 8.9 apply for MBSFN measurements (MBSFN RSRP, MBSFN RSRQ, and MCH BLER defined in [4]), which are performed in RRC_CONNECTED and logged for MDT by UEs which are MBMS-capable and also indicate their MBSFN measurement logging capability [2].

UE shall measure MBSFN RSRP, MBSFN RSRQ and MCH BLER only in subframes and on carriers where UE is decoding PMCH. The requirements are specified for any carrier where PMCH is received by UE. The requirements specified in this section apply for any carrier frequency with configured MBSFN subframes with PMCH, which may be the same as or different from any serving unicast carrier.

The UE receiving PMCH on any non-serving carrier and performing MBSFN measurements shall not cause interruptions on any serving carrier in unicast subframes and in the subframes with non-MBSFN multicast transmissions such as system information.

The requirements in section 8.9 shall also appy, when the UE is configured to perform SRS carrier based switching.

The requirements in Section 8.9 apply for 15 kHz subcarrier spacing configured in MBSFN subframes. The same requirements apply also for 370.73 Hz, 2.5 kHz, 1.25 kHz and 7.5 kHz subcarrier spacing, provided that MBSFN RSRP|dBm/(L) kHz = MBSFN RSRP|dBm/15kHz + $10 \cdot \log_{10}(L/15)$, where L is 370.73 Hz, 2.5 kHz, 1.25 kHz or 7.5 kHz.

### 8.9.2 MBSFN RSRP Measurements

The UE physical layer shall be capable of performing the MBSFN RSRP measurement [4] within the MBSFN RSRP measurement period and report the measurement, while meeting the MBSFN RSRP measurement accuracy requirements specified in section 9.8.2.

The MBSFN RSRP measurement period is defined as the maximum between 640ms and the period during which the UE decodes [5, Section 10] 5 subframes containing PMCH transmissions except SCS = 370.37 Hz numerology. For SCS = 370.37 Hz numerology, the MBSFN RSRP measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 symbols containing PMCH transmissions).

The MBSFN RSRP measurement period is the same for UE using any DRX cycle, any eDRX_CONN cycle, or no DRX.

### 8.9.3 MBSFN RSRQ Measurements

The UE physical layer shall be capable of performing the MBSFN RSRQ measurement [4] within the MBSFN RSRP measurement period and report the measurement, while meeting the MBSFN RSRQ measurement accuracy requirements specified in section 9.8.3.

The MBSFN RSRQ measurement period is defined as the maximum between 640ms and the period during which the UE decodes [5, Section 10] 5 subframes containing PMCH transmissions except SCS = 370.37 Hz numerology. For SCS = 370.37 Hz numerology, the MBSFN RSRP measurement period is defined as MAX(640 ms, period during which the UE decodes [5, Section 10] 5 symbols containing PMCH transmissions).

The MBSFN RSRQ measurement period is the same for UE using any DRX cycle, any eDRX_CONN cycle, and no DRX.

### 8.9.4 MCH BLER Measurements

The UE physical layer shall be capable of performing and reporting the MCH BLER measurement [4] to higher layers within the MCH BLER measurement period. The MCH BLER measurement reporting is according to section 9.8.4.

The MCH BLER measurement period is equal to the MBSFN logging interval configured by higher layers [2].

## 8.10 Proximity-based Services

### 8.10.1 Introduction

This section contains the requirements for the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery in RRC_CONNECTED state.

### 8.10.2 Requirements

When a UE in RRC_CONNECTED state is performing transmissions and/or reception for ProSe Direct Discovery and/or ProSe Direct Communication, the UE shall meet all the requirements specified in Section 8.

Note: The UE may need to interrupt ProSe operation in order to meet the measurement requirements of Section 8.

#### 8.10.2.1 Initiation/Cease of SLSS transmissions with ProSe Direct Discovery

The requirements in this subclause are applicable to a UE capable of ProSe Direct Discovery and SLSS transmission and reception.

The requirements apply when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType19*. The UE shall be capable of measuring the RSRP of the cell used to transmit Prose Direct Discovery announcements and evaluate to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$ where,

- $T_{evaluate,SLSS}$ = 0.4 seconds when UE is not configured with DRX, or,
- $T_{evaluate,SLSS}$ = as specified in Table 8.10.2.1-1 when UE is configured with DRX.

**Table 8.10.2.1-1: $T_{evaluate,SLSS}$ with ProSe Direct Discovery**

| DRX cycle length [s] | $T_{evaluate,SLSS}$ [s] (number of DRX cycles) |
|---|---|
| ≤0.04 | 0.4 (Note 1) |
| 0.04<DRX-cycle≤2.56 | Note 2 (6) |
| Note1: Number of DRX cycles depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycles in use | |

If higher layer filtering is configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the cell used to transmit ProSe Direct Discovery announcements:

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 and RSRQ related side conditions given in Clause 9.1.5.1 for a corresponding Band are fulfilled,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band are fulfilled.

### 8.10.2.2 Initiation/Cease of SLSS transmissions with ProSe Direct Communication

The requirements in this subclause are applicable to a UE capable of ProSe Direct Communication.

The requirements apply when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType18*. The UE shall be capable of measuring the RSRP of the cell used to transmit Prose Direct Communication to evaluate to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$

where,

- $T_{evaluate,SLSS}$ = 0.4 seconds when UE is not configured with DRX.
- $T_{evaluate,SLSS}$ = as specified in Table 8.10.2.2-1 when UE is configured with DRX.

**Table 8.10.2.2-1: $T_{evaluate,SLSS}$ with ProSe Direct Communication**

| DRX cycle length [s] | $T_{evaluate,SLSS}$ [s] (number of DRX cycles) |
|---|---|
| ≤0.04 | 0.4 (Note 1) |
| 0.04<DRX-cycle≤2.56 | Note 2 (6) |
| Note1: Number of DRX cycles depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycles in use | |

If higher layer filtering is configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the cell used to transmit ProSe Direct Communication:

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 and RSRQ related side conditions given in Clause 9.1.5.1 for a corresponding Band are fulfilled,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band are fulfilled.

## 8.11 Discovery Signal Measurements under Operation with Frame Structure 3

### 8.11.1 Introduction

This section contains requirements on the UE for measurement reporting in RRC_CONNECTED state when discovery signal [16] is configured. The requirements are specified for E-UTRA CRS based discovery signal measurements and CSI-RS based discovery signal measurements.

The requirements in Section 8.11.2 shall apply for CRS based discovery signal measurements comprising RSRP and RSRQ measurements [4]. The requirements in Section 8.11.3 shall apply for CSI-RS based discovery signal measurements comprising CSI-RSRP measurements [4]. The requirements in Section 8.11.4 shall apply for UE RSSI measurements [4]. The requirements in Section 8.11.5 shall apply for UE channel occupancy measurements [2].

The measurement quantities are defined in [4], the measurement model is defined in [22] and measurement accuracy requirements are specified in Section 9. Control of measurement reporting is specified in TS 36.331 [2].

The requirements in Section 8.11 shall apply for carrier with E-UTRA operation following the frame structure type 3 [16].

The requirements in Section 9 are applicable for a UE performing measurements according to Section 8.11.

## 8.11.2 CRS based discovery signal measurements

### 8.11.2.1 E-UTRAN intra-frequency measurements

NOTE: The requirements in this section are applicable only for measurements on SCC following the frame structure type 3 [16].

The UE shall be able to identify new intra-frequency FS3 cells and perform measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra-frequency cells and additionally search for and identify new intra-frequency cells.

#### 8.11.2.1.1 Requirements

##### 8.11.2.1.1.1 Requirements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FS3 intra-frequency cell within the cell identification time $T_{identify_intra_FS3,}$ where the identification time of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_intra_FS3_CRS}$, where:

$T_{identify_intra_FS3}$ is the intra-frequency cell identification period as specified in Table 8.11.2.1.1.1-1,

$T_{measure_intra_FS3_CRS}$ is the intra-frequency period for measurements as shown in Table 8.11.2.1.1.1-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

L is the number of configured discovery signal occasions which are not available during $T_{identify_intra_FS3}$ for cell identification at the UE due to the absence of the necessary radio signals from the cell or due to the corresponding downlink subframe being configured as an uplink subframe,

M is the number of configured discovery signal occasions which are not available during $T_{measure_intra_FS3_CRS}$ for the measurements at the UE due to the absence of the necessary radio signals from the cell or due to the corresponding downlink subframe being configured as an uplink subframe.

**Table 8.11.2.1.1.1-1: Intra-frequency cell identification requirement under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{identify_intra_FS3}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (6+L) * k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (24+L) * k1*k2* $T_{DMTC_periodicity}$ |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (2+L) * k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (8+L) * k1*k2* $T_{DMTC_periodicity}$ |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.
NOTE 2: The requirements for measurement bandwidth ⩾25 RB are optional.
NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

$k2=\max\left(2,\left\lceil\frac{N_{FS3_SCC}}{2}\right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$ is 0.

NOTE 4: The requirements apply, provided that L is such that the intra-frequency cell identification period $T_{identify_intra_FS3}$ does not exceed 72*k1*k2 $T_{DMTC_periodicity}$.

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_intra_FS3}$:

- RSRP related side conditions given in Section 9.1.18.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Section 9.1.18.3 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Table 8.11.2.1.1.1-1.

If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is $T_{measure_intra_FS3_CRS}$ as shown in Table 8.11.2.1.1.1-2, when no DRX is in use. The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers within the measurement period of $T_{measure_intra_FS3_CRS}$.

**Table 8.11.2.1.1.1-2: Intra-frequency measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{measure_intra_FS3_CRS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (5+M) * k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M) * k1*k2* $T_{DMTC_periodicity}$ |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (1+M) * k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M) * k1*k2* $T_{DMTC_periodicity}$ |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.
NOTE 2: The requirements for measurement bandwidth ⩾25 RB are optional.
NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$ is 0.

NOTE 4: The requirements apply, provided that M is such that the intra-frequency measurement period $T_{measure_intra_FS3_CRS}$ does not exceed 60*k1*k2 $T_{DMTC_periodicity}$.

The RSRP measurement accuracy for all measured cells shall be as specified in Section 9.1.18.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in Section 9.1.18.3.

### 8.11.2.1.1.1.1 Measurement Reporting Requirements

#### 8.11.2.1.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

#### 8.11.2.1.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.2.1.1.1.3.

#### 8.11.2.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_FS3}$ defined in Section 8.11.2.1.1.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FS3}$ defined in Section 8.11.2.1.1.1 becomes undetectable for a period $\leq 8$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_intra_FS3_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

#### 8.11.2.1.1.2 Requirements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FS3 intra-frequency cell within the cell identification time $T_{identify_intra_FS3_DRX}$, where the cell identification time of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_intra_FS3_CRS_DRX}$, where:.

$T_{identify_intra_FS3_DRX}$ is the intra-frequency period for cell identification as shown in Table 8.11.2.1.1.2-1,

$T_{measure_intra_FS3_CRS_DRX}$ is the intra-frequency period for measurements as shown in Table 8.11.2.1.1.2-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

L is the number of configured discovery signal occasions during ON DURATION and which are not available during $T_{identify_intra_FS3_DRX}$ for cell identification at the UE due to the absence of the necessary radio signals from the cell or due to the corresponding downlink subframe being configured as an uplink subframe,

M is the number of configured discovery signal occasions during ON DURATION and which are not available during $T_{measure_intra_FS3_CRS_DRX}$ for the measurements at the UE due to the absence of the necessary radio signals from the cell or due to the corresponding downlink subframe being configured as an uplink subframe.

**Table 8.11.2.1.1.2-1: Intra-frequency cell identification requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{identify_intra_FS3_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (6+L)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (24+L)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (2+L)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (8+L)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms. | | | |

NOTE 2: The requirements for measurement bandwidth $\geqslant$25 RB are optional.

NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell during ON DURATION or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$ is 0.

NOTE 4: The requirements apply, provided that L is such that the intra-frequency cell identification period $T_{identify_intra_FS3_DRX}$ does not exceed 72*k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length}.

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_intra_FS3_DRX}$:

- RSRP related side conditions given in Section 9.1.18.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Section 9.1.18.3 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Table 8.11.2.1.1.2-1.

If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is $T_{measure_intra_FS3_CRS_DRX}$ as shown in Table 8.11.2.1.1.2-2, when DRX is in use. The UE shall be capable of p performing RSRP and RSRQ measurements for 3 identified intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers within the measurement period of $T_{measure_intra_FS3_CRS_DRX}$.

**Table 8.11.2.1.1.2-2: Intra-frequency measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{measure_intra_FS3_CRS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (5+M)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (1+M)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M)* k1*k2*Max{$T_{DMTC_periodicity}$, DRX cycle length} |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

NOTE 2: The requirements for measurement bandwidth $\geqslant$25 RB are optional.

NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell during ON DURATION or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided

that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$ is 0.

NOTE 4: The requirements apply, provided that M is such that the intra-frequency measurement period $T_{measure_intra_FS3_CRS_DRX}$ does not exceed 60*k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length}.

The RSRP measurement accuracy for all measured cells shall be as specified in Section 9.1.18.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in Section 9.1.18.3.

#### 8.11.2.1.1.2.1 Measurement Reporting Requirements

##### 8.11.2.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

##### 8.11.2.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.2.1.1.2.1.3.

##### 8.11.2.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in Sections 9.1.18.2 and 9.1.18.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_FS3_DRX}$ defined in Section 8.11.2.1.1.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_FS3_DRX}$ defined in Section 8.11.2.1.1.2 becomes undetectable for a period $\leq$ 8 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_intra_FS3_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

### 8.11.2.2 E-UTRAN inter-frequency measurements

The UE shall be able to identify new inter-frequency cells and perform RSRP and RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided. The discovery signal occasion and the measurement gap should be aligned, provided that also the following additional conditions are fulfilled:

Entire discovery signal occasion should be contained in the measurement gap.

The subframe contained discovery signal for the measurement is not overlapped with the first 0.5 ms period and the last 0.5 ms period in every gap.

### 8.11.2.2.1 E-UTRAN FDD-FS3 inter-frequency measurements

#### 8.11.2.2.1.1 E-UTRAN FDD – FS3 inter-frequency measurements when no DRX is used

When measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FS3 inter-frequency cell within the cell identification time $T_{identify_inter_FS3}$, which shall include detection of the cell and additionally performing a single measurement within the measurement period of $T_{measure_inter_FS3_CRS}$ when no DRX is used, where:

$T_{identify_inter_FS3}$ is the inter-frequency period for cell identification as shown in Table 8.11.2.2.1.1-1,

$T_{measure_inter_FS3_CRS}$ is the inter-frequency period for measurements as shown in Table 8.11.2.2.1.1-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

$N_{freq}$ is defined in Section 8.1.2.1.1,

*N* is the number of carriers operating under FS3 and which are subject to the channel assessment prior to transmissions,

L is the number of configured discovery signal occasions which are not available during the time for cell identification at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell,

M is the number of configured discovery signal occasions which are not available during $T_{measure_inter_FS3_CRS}$ for the measurements at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell.

If higher layer filtering is used, an additional cell identification delay can be expected.

The requirements in this section apply, provided that L and M are such that: the inter-frequency cell identification period $T_{identify_inter_FS3}$ does not exceed $75 * N_{freq} * \text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$, and the inter-frequency period $T_{measure_inter_FS3_CRS}$ for measurements does not exceed $60 * N_{freq} * \text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$.

**Table 8.11.2.2.1.1-1: Inter-frequency cell identification requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth Note2 [RB] | CRS Ês/Iot | $T_{identify_inter_FS3}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | $(7*N_{freq}+L*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | $(25*N_{freq}+L*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | $(3*N_{freq}+L*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | $(9*N_{freq}+L*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.<br>NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional. | | | |

**Table 8.11.2.2.1.1-2: Inter-frequency measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth Note2 [RB] | CRS Ês/Iot | $T_{measure_inter_FS3_CRS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | $(5*N_{freq}+M*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | $(20*N_{freq}+M*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | $(1*N_{freq}+M*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | $(4*N_{freq}+M*N)*\text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$ |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.<br>NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional. | | | |

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_inter_FS3}$:

- RSRP related side conditions given in Section 9.1.18.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Section 9.1.18.3 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.13.1 for a corresponding Band,
- SCH Ês/Iot is according to Table 8.11.2.2.1.1-1.

When measurement gaps are scheduled for FS3 inter-frequency measurements or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in Sections 9.1.18.2 and 9.1.18.3, respectively, with measurement period given by table 8.11.2.2.1.1-2.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per FS3 inter-frequency for up to 3 FS3 inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.11.2.2.1.1-2 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

The RSRP measurement accuracy for all measured cells shall be as specified in Section 9.1.18.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in Section 9.1.18.3.

#### 8.11.2.2.1.1.1 Measurement Reporting Requirements

##### 8.11.2.2.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.18.2 and 9.1.18.3, respectively.

##### 8.11.2.2.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.18.2, and 9.1.18.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.2.2.1.1.1.3.

##### 8.11.2.2.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.18.2 and 9.1.18.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_FS3}$ defined in Section 8.11.2.2.1.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_FS3}$ defined in Section 8.11.2.2.1.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measure_inter_FS3_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

8.11.2.2.1.2 E-UTRAN FDD – FS3 inter-frequency measurements when DRX is used

When measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectavle FS3 inter-frequency cell within the cell identification time $T_{identify_inter_FS3_DRX}$, which shall include detection of the cell and additionally performing a single measurement within the measurement period of $T_{measure_inter_FS3_CRS_DRX}$ when DRX is used, where:

$T_{identify_inter_FS3_DRX.}$ is the inter-frequency period for measurements as shown in Table 8.11.2.2.1.2-1,

$T_{measure_inter_FS3_CRS_DRX}$ is the inter-frequency period for measurements as shown in Table 8.11.2.2.1.2-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

$N_{freq}$ is defined in Section 8.1.2.1.1,

*N* is the number of carriers operating under FS3 and which are subject to the channel assessment prior to transmissions,

L is the number of configured discovery signal occasions which are not available during the time for cell identification at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell,

M is the number of configured discovery signal occasions which are not available during $T_{measure_inter_FS3_CRS_DRX}$ for the measurements at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell.

The requirements in this section apply, provided that L and M are such that: the inter-frequency cell identification period $T_{identify_inter_FS3_DRX}$ does not exceed 75 *$N_{freq}$* Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length}, and the inter-frequency period $T_{measure_inter_FS3_CRS_DRX}$ for measurements does not exceed 60* $N_{freq}$ * Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length}.

If higher layer filtering is used, an additional cell identification delay can be expected.

**Table 8.11.2.2.1.2-1: Inter-frequency cell identification requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth Note2 [RB] | CRS Ês/Iot | $T_{identify_inter_FS3_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (7*$N_{freq}$ +L*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (25*$N_{freq}$ +L*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (3*$N_{freq}$ +L*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (9*$N_{freq}$ +L*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms. | | | |
| NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional. | | | |

**Table 8.11.2.2.1.2-2: Inter-frequency measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth Note2 [RB] | CRS Ês/Iot | $T_{measure_inter_FS3_CRS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (5*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (1*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.
NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional.

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_inter_FS3_DRX}$:

- RSRP related side conditions given in Section 9.1.18.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Section 9.1.18.3 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.13.1 for a corresponding Band,
- SCH Ês/Iot is according to Table 8.11.2.2.1.2-1.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 3 identified inter-frequency cells per FS3 inter-frequency for up to 3 FS3 inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in table 8.11.2.2.1.2-2 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

The RSRP measurement accuracy for all measured cells shall be as specified in Section 9.1.18.2, and the RSRQ measurement accuracy for all measured cells shall be as specified in Section 9.1.18.3.

#### 8.11.2.2.1.2.1 Measurement Reporting Requirements

##### 8.11.2.2.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.18.2 and 9.1.18.3, respectively.

##### 8.11.2.2.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.18.2 and 9.1.18.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.2.2.1.2.1.3.

##### 8.11.2.2.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.18.2, and 9.1.18.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_FS3_DRX}$ defined in Section 8.11.2.2.1.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_FS3_DRX}$ defined in Section 8.11.2.2.1.2 becomes undetectable for a period ≤ 8 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_inter_FS3_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

#### 8.11.2.2.2 E-UTRAN TDD – FS3 inter-frequency measurements

##### 8.11.2.2.2.1 E-UTRAN TDD – FS3 inter-frequency measurements when no DRX is used

The requirements in this section for UE configured with TDD PCell and no DRX are the same as the requirements in Section 8.11.2.2.1.1.

##### 8.11.2.2.2.2 E-UTRAN TDD – FS3 inter-frequency measurements when DRX is used

The requirements in this section for UE configured with TDD PCell and DRX are the same as the requirements in Section 8.11.2.2.1.2.

## 8.11.3 CSI-RS based discovery signal measurements

### 8.11.3.1 E-UTRAN intra-frequency measurements

The UE shall be able to identify new intra-frequency FS3 TPs and perform CSI-RSRP measurements of intra-frequency TPs with an explicit intra-frequency TP list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra-frequency TPs and additionally search for and identify new intra-frequency TPs.

#### 8.11.3.1.1 Requirements

##### 8.11.3.1.1.1 Requirements when no DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FS3 intra-frequency TP within the identification period $T_{identify_intra_TP_FS3}$, where identification of a TP shall include cell identification and additionally performing a single measurement on the TP.

$T_{identify_intra_TP_FS3} = T_{identify_intra_FS3} + T_{measure_intra_FS3_CSI\text{-}RS}$,

where

$T_{identify_intra_FS3}$ is the intra-frequency period for cell identification in Section 8.11.2.1.1.1,

$T_{measure_intra_FS3_CSI\text{-}RS}$ is the intra-frequency period for TP measurement as shown in Table 8.11.3.1.1.1-1,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

M is the number of configured discovery signal occasions which are not available during $T_{measure_intra_FS3_CSI\text{-}RS}$ for the measurements at the UE due to the absence of the necessary radio signals from the TP or due to the corresponding downlink subframe being configured as an uplink subframe.

During $T_{identify_intra_TP_FS3}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_intra_TP_FS3}$:

- CSI-RSRP related side conditions given in Section 9.1.18.4 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Section 8.11.2.1.1.1.

Identification of a TP shall include identification of the cell and additionally performing a single measurement on the TP within the measurement period of $T_{measure_intra_FS3_CSI\text{-}RS}$ when no DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra-frequency measurements is $T_{measure_intra_FS3_CSI\text{-}RS}$ as shown in table 8.11.3.1.1.1-1, when no DRX is in use. The UE shall be capable of performing CSI-RSRP measurements

for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_FS3_CSI-RS}$

**Table 8.11.3.1.1.1-1: Intra-frequency TP measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CSI-RS Ês/Iot | $T_{measure_intra_FS3_CSI-RS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤ CSI-RS Ês/Iot | (5+M) *k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M) *k1*k2* $T_{DMTC_periodicity}$ |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CSI-RS Ês/Iot | (1+M) *k1*k2* $T_{DMTC_periodicity}$ |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M) *k1*k2* $T_{DMTC_periodicity}$ |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

NOTE 2: The requirements for measurement bandwidth ⩾25 RB are optional.

NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured TP; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured TP or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured TP not overlapping with the inter-frequency measurement gaps measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$ is 0.

NOTE 4: The requirements apply, provided that M is such that the intra-frequency period for TP measurement $T_{measure_intra_FS3_CSI-RS}$ does not exceed 60*k1*k2* $T_{DMTC_periodicity}$.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in Section 9.1.18.4.

#### 8.11.3.1.1.1.1 Measurement Reporting Requirements

##### 8.11.3.1.1.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.1.18.4.

##### 8.11.3.1.1.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.1.18.4.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.3.1.1.1.1.3.

##### 8.11.3.1.1.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in Section 9.1.18.4.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_FS3}$ defined in Section 8.11.3.1.1.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_FS3}$ defined in Section 8.11.3.1.1.1 becomes undetectable for a period $\leq 8$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_intra_FS3_CSI\text{-}RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

#### 8.11.3.1.1.2 Requirements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FS3 intra-frequency TP within the identification period $T_{identify_intra_TP_FS3_DRX}$ , where identification of a TP shall include cell identification and additionally performing a single measurement on the TP.

$$T_{identify_intra_TP_FS3_DRX} = T_{identify_intra_FS3_DRX} + T_{measure_intra_FS3_CSI\text{-}RS_DRX},$$

where:

$T_{identify_intra_FS3_DRX}$ is the intra-frequency period for cell identification in Section 8.11.2.1.1.2.

$T_{measure_intra_FS3_CSI\text{-}RS_DRX}$ is the intra-frequency period for TP measurement as shown in Table 8.11.3.1.1.2-1, where

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

M is the number of configured discovery signal occasions during ON DURATION and which are not available duting $T_{measure_intra_FS3_CSI\text{-}RS_DRX}$ for the measurements at the UE due to the absence of the necessary radio signals from the TP or due to the corresponding downlink subframe being configured as an uplink subframe.

During $T_{identify_intra_TP_FS3_DRX}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_intra_TP_FS3_DRX}$:

- CSI-RSRP related side conditions given in Section 9.1.18.4 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Section 8.11.2.1.1.2.

Identification of a TP shall include identification of the cell and additionally performing a single measurement on the TP within measurement period of $T_{measure_intra_FS3_CSI\text{-}RS_DRX}$ when DRX is used. If higher layer filtering is used, an additional TP identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_FS3_CSI\text{-}RS_DRX}$ as shown in Table 8.11.3.1.1.2-1, when DRX is in use. The UE shall be capable of performing CSI-RSRP measurements for 3 identified intra-frequency TPs, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_FS3_CSI\text{-}RS_DRX}$.

**Table 8.11.3.1.1.2-1: Intra-frequency TP measurement requirements under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CSI-RS Ês/Iot | $T_{measure_intra_FS3_CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤CSI-RS Ês/Iot | (5+M) *k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M) *k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length} |

| | | | |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤CSI-RS Ês/Iot | (1+M) *k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M) *k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length} |

NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.
NOTE 2: The requirements for measurement bandwidth ⩾25 RB are optional.
NOTE 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured TP during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured TP during ON DURATION or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

$k2=\max\left(2,\left\lceil\frac{N_{FS3_SCC}}{2}\right\rceil\right)$ when DMTC occasions in the measured TP not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

NOTE 4: The requirements apply, provided that M is such that the intra-frequency period for TP measurement $T_{measure_intra_FS3_CSI-RS_DRX}$ does not exceed 60*k1*k2* Max{$T_{DMTC_periodicity}$, DRX cycle length}.

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in Section 9.1.18.4.

#### 8.11.3.1.1.2.1 Measurement Reporting Requirements

##### 8.11.3.1.1.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.1.18.4.

##### 8.11.3.1.1.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.1.18.4.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.11.3.1.1.2.1.3.

##### 8.11.3.1.1.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in Section 9.1.18.4.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_TP_FS3_DRX}$ defined in Section 8.11.3.1.1.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_intra_TP_FS3_DRX}$ defined in Section 8.11.3.1.1.2 becomes undetectable for a period ≤ 8 seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_intra_FS3_CSI-RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

### 8.11.3.2 E-UTRAN inter-frequency measurements

The UE shall be able to identify new inter-frequency TPs and perform CSI-RSRP measurements of the idenitified inter-frequency TPs with an explicit inter-frequency TP list containing physical layer cell identities. The discovery signal occasion and the measurement gap should be aligned, provided that also the following additional conditions are fulfilled:

Entire discovery signal occasion should be contained in the measurement gap.

The subframe contained discovery signal for the measurement is not overlapped with the first 0.5 ms period and the last 0.5 ms period in every gap.

#### 8.11.3.2.1 E-UTRAN FDD – FS3 inter-frequency measurements

##### 8.11.3.2.1.1 E-UTRAN FDD – FS3 inter-frequency measurements when no DRX is used

When measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FS3 inter-frequency TP within the TP identification time $T_{identify_inter_TP_FS3}$ according to the following expression:

$T_{identify_inter_TP_FS3} = T_{identify_inter_FS3} + T_{measure_inter_FS3_CSI-RS,}$

where

$T_{identify_inter_FS3}$ is the inter-frequency period for cell identification in Section 8.11.2.2.1.1,

$T_{measure_inter_FS3_CSI-RS}$ is the inter-frequency period for TP measurement as shown in Table 8.11.3.2.1.1-1,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

$N_{freq}$ is defined in section 8.1.2.1.1,

*N* is the number of carriers operating under FS3 and which are subject to the channel assessment prior to transmissions,

M is the number of configured discovery signal occasions which are not available during $T_{measure_inter_FS3_CSI-RS}$ for the measurements at the UE during measurement gaps due to the absence of the necessary radio signals from the measured TP.

The requirements in this section apply, provided that M is such that: the inter-frequency period $T_{measure_inter_FS3_CSI-RS}$ for TP measurements does not exceed $60 * N_{freq} * \text{Max}\{T_{DMTC_periodicity}, \text{MGRP}\}$.

During $T_{identify_inter_TP_FS3}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_inter_TP_FS3}$:

- CSI-RSRP related side conditions given in Section 9.1.18.4 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.13.2 for a corresponding Band,
- SCH Ês/Iot is according to Table 8.11.2.2.1.1-1.

When measurement gaps are scheduled for FS3 inter-frequency measurements or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with measurement accuracy as specified in section 9.1.18.4, with measurement period given by table 8.11.3.2.1.1-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TPs per FS3 inter-frequency for up to 3 FS3 inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP

measurements to higher layers with the measurement period defined in table 8.11.3.2.1.1-1 when no DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.11.3.2.1.1-1: Requirements to measure FS3 inter-frequency TP**

| SCH Ês/Iot | CSI-RS measurement bandwidth Note2 [RB] | CSI-RS Ês/Iot | $T_{measure_inter_FS3_CSI-RS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤ CSI-RS Ês/Iot | (5*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP } |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CSI-RS Ês/Iot | (1*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP} |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms. | | | |
| NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional. | | | |

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in section 9.1.18.4.

8.11.3.2.1.1.1 Measurement Reporting Requirements

8.11.3.2.1.1.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.18.4.

8.11.3.2.1.1.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in section 9.1.18.4.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in section 8.11.3.2.1.1.1.3.

8.11.3.2.1.1.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in section 9.1.18.4.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_FS3}$ defined in Section 8.11.3.2.1.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_FS3}$ defined in Section 8.11.3.2.1.1 becomes undetectable for a period ≤ 8 seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_inter_FS3_CSI-RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

8.11.3.2.1.2 E-UTRAN FDD – FS3 inter-frequency measurements when DRX is used

When DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FS3 inter-frequency TP within $T_{identify_inter_TP_FS3_DRX}$ according to the following expression:

$T_{identify_inter_TP_FS3_DRX} = T_{identify_inter_FS3_DRX} + T_{measure_inter_FS3_CSI\text{-}RS_DRX}$ ,

where

$T_{identify_inter_FS3_DRX}$ is the inter-frequency period for cell identification in Section 8.11.2.2.1.2,

$T_{measure_inter_FS3_CSI\text{-}RS_DRX}$ is the inter-frequency period for TP measurement as shown in Table 8.11.3.2.1.2-1,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

$N_{freq}$ is defined in section 8.1.2.1.1,

*N* is the number of carriers operating under FS3 and which are subject to the channel assessment prior to transmissions,

M is the number of configured discovery signal occasions which are not available during $T_{measure_inter_FS3_CSI\text{-}RS_DRX}$ for the measurements at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell.

The requirements in this section apply, provided that M is such that: the inter-frequency period $T_{measure_inter_FS3_CSI\text{-}RS_DRX}$ for TP measurements does not exceed 60* $N_{freq}$ * Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length}.

During $T_{identify_inter_TP_FS3_DRX}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_inter_TP_FS3_DRX}$:

- CSI-RSRP related side conditions given in Sections 9.1.18.4 are fulfilled for a corresponding Band,
- SCH_RP is according to Annex B.2.13.2 for a corresponding Band,
- SCH Ês/Iot is according to Table 8.11.2.2.1.2-1.

When measurement gaps are scheduled for FS3 inter-frequency measurements or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with measurement accuracy as specified in section 9.1.18.4, with measurement period given by table 8.11.3.2.1.2-1.

The UE shall be capable of performing CSI-RSRP measurements of at least 3 identified inter-frequency TPs per FS3 inter-frequency for up to 3 FS3 inter-frequencies and the UE physical layer shall be capable of reporting CSI-RSRP measurements to higher layers with the measurement period defined in table 8.11.3.2.1.2-1 when DRX is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps.

**Table 8.11.3.2.1.2-1: Requirements to measure FS3 inter-frequency TP**

| SCH Ês/Iot | CSI-RS measurement bandwidth Note2 [RB] | CSI-RS Ês/Iot | $T_{measure_inter_FS3_CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤ CSI-RS Ês/Iot | (5*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CSI-RS Ês/Iot | (1*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4*$N_{freq}$ +M*N)*Max{$T_{DMTC_periodicity}$, MGRP, DRX cycle length} |
| NOTE 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms. | | | |
| NOTE 2: The requirements for measurement bandwidth ≥25 RB are optional. | | | |

The CSI-RSRP measurement accuracy for all measured TPs shall be as specified in section 9.1.18.4.

#### 8.11.3.2.1.2.1 Measurement Reporting Requirements

##### 8.11.3.2.1.2.1.1 Periodic Reporting

Reported CSI-RSRP measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.18.4.

##### 8.11.3.2.1.2.1.2 Event-triggered Periodic Reporting

Reported CSI-RSRP measurements contained in event triggered periodic measurement reports shall meet the requirements in section 9.1.18.4.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in section 8.11.3.2.1.2.1.3.

##### 8.11.3.2.1.2.1.3 Event Triggered Reporting

Reported CSI-RSRP measurements contained in event triggered measurement reports shall meet the requirements in section 9.1.18.4.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_TP_FS3_DRX}$ defined in section 8.11.3.2.1.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_inter_TP_SCE_DRX}$ defined in clause 8.11.3.2.1.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measure_inter_FS3_CSI-RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting, an additional delay can be expected.

### 8.11.3.2.2 E-UTRAN TDD – FS3 inter-frequency measurements

#### 8.11.3.2.2.1 E-UTRAN TDD – FS3 inter-frequency measurements when no DRX is used

The requirements in this section for UE configured with TDD PCell and no DRX are the same as the requirements in Section 8.11.3.2.1.1.

#### 8.11.3.2.2.2 E-UTRAN TDD – FS3 inter-frequency measurements when DRX is used

The requirements in this section for UE configured with TDD PCell and DRX are the same as the requirements in Section 8.11.3.2.1.2.

## 8.11.4 RSSI measurements

### 8.11.4.1 E-UTRAN intra-frequency measurements

NOTE: The requirements in this section are applicable only for measurements on SCC following the frame structure type 3 [16].

The UE physical layer shall be capable of performing the RSSI measurements [4] on one or more serving carriers operating under frame structure type 3 [16], if the carrier(s) are indicated by higher layers [2], and reporting the RSSI

measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [2] occurring with a configured RSSI measurement timing configuration periodicity [2]. The RSSI measurement period corresponds to max(*reportInterval*, *rmtc-Period*) when no DRX is used and max(*reportInterval*, *rmtc-Period*, *DRX cycle length*) when DRX is used, where *reportInterval* and *rmtc-Period* [2] are configured for the RSSI measurement by higher layers.

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section 9.1.18.5.2.

### 8.11.4.2 E-UTRAN inter-frequency measurements

The UE physical layer shall be capable of performing the RSSI measurements [4] on one or more inter-frequency carriers operating under frame structure type 3 [16], if the carrier(s) are indicated by higher layers [2], and reporting the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [2] occurring with a configured RSSI measurement timing configuration periodicity [2]. The RSSI measurement period corresponds to max(*reportInterval*, *rmtc-Period** $N_{freq}$, MGRP*$N_{freq}$) when no DRX is used and max(*reportInterval*, $N_{freq}$ * max*(rmtc-Period*, MGRP, *DRX cycle length*)) when DRX is used, where *reportInterval* and *rmtc-Period* [2] are configured for the RSSI measurement by higher layers, and $N_{freq}$ is defined in clause 8.1.2.1.1.

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should fulfilled:

Entire RSSI measurement duration should be contained in the measurement gap.

UE is not required to perform RSSI measurement on symbols overlapped with the first 0.5 ms period and the last 0.5 ms period in every gap.

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section 9.1.18.5.3.

## 8.11.5 Channel occupancy measurements

### 8.11.5.1 E-UTRAN intra-frequency channel occupancy measurements

NOTE: The requirements in this section are applicable only for measurements on SCC following the frame structure type 3 [16].

The UE shall be capable of estimating the channel occupancy on one or more serving carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer. The channel occupancy measurement period corresponds to max(*reportInterval*, *rmtc-Period*) when no DRX is used and max(*reportInterval*, *rmtc-Period*, *DRX cycle length*) when DRX is used, where *reportInterval* and *rmtc-Period* [2] are configured for the channel occupancy measurement by higher layers.

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section 9.1.18.6.1.

### 8.11.5.2 E-UTRAN inter-frequency channel occupancy measurements

The UE shall be capable of estimating the channel occupancy on one or more carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer. The channel occupancy measurement period corresponds to max(*reportInterval*, *rmtc-Period**$N_{freq}$, MGRP*$N_{freq}$) when no DRX is used and max(*reportInterval*, $N_{freq}$ * max*(rmtc-Period*, MGRP, *DRX cycle length*)) when DRX is used, where *reportInterval* and *rmtc-Period* [2] are configured for the channel occupany measurement by higher layers, and $N_{freq}$ is defined in clause 8.1.2.1.1.

If the UE requires measurement gaps to perform inter-frequency measurements, a single measurement gap pattern is used for all concurrent inter-frequency measurements, including inter-frequency channel occupancy measurements.

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section 9.1.18.6.2.

# 8.12 Discovery Signal Measurements for E-UTRA Carrier Aggregation under Operation with Frame Structure 3

## 8.12.1 Introduction

This section contains requirements on UE capabilities for support of E-UTRA carrier aggregation under operation with frame structure 3.

Non configured frequencies may be measured with measurement gaps according to the requirements in Section 8.11.2.2 and Section 8.11.3.2.

The requirements in Section 8.12 shall apply for SCC with E-UTRA operation following the frame structure type 3 [16].

## 8.12.2 CRS based discovery signal measurements for E-UTRA carrier aggregation

### 8.12.2.1 Introduction

The requirements in Section 8.12.2 shall apply for CRS based discovery signal measurements comprising RSRP and RSRQ measurements [4].

### 8.12.2.2 Measurements of a secondary component carrier

A secondary component carrier may be activated and deactivated by MAC-CE commands as specified in [17]. The applicable performance requirements depend on whether the SCell on the corresponding frequency is actived or deactivated.

### 8.12.2.3 Measurements of a secondary component carrier with active SCell

When the SCell is activated, measurement performance requirements for the frequency are those given in Section 8.11.2.1. If common DRX is in use, then the requirements for that secondary component carrier are given by the DRX requirements in Section 8.11.2.1.1.2, otherwise the non-DRX requirements are applicable. The applicable measurement accuracy requirements are in Section 9.1.19.

### 8.12.2.4 Measurements of a secondary component carrier with deactivated SCell

This section defines the measurement requirements of a secondary component carrier with deactivated SCell based on the parameter *measCycleSCell* defined in TS 36.331 [2].

#### 8.12.2.4.1 E-UTRAN secondary component carrier measurements when no common DRX is used

When no DRX is in use the UE shall be able to identify a new detectable cell on a secondary component carrier within the cell identification time $T_{identify_SCC_FS3}$, where the cell identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_SCC_FS3_CRS}$.

$T_{identify_SCC_FS3}$ is the time period for cell identification as specified in Table 8.12.2.4.1-1,

$T_{measure_SCC_FS3_CRS}$ is thetime period for measurements as shown in Table 8.12.2.4.1-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

L is the number of configured discovery signal occasions which are not available during $T_{identify_SCC_FS3}$ for cell identification at the UE due to the absence of the necessary radio signals from the cell,

M is the number of configured discovery signal occasions which are not available during $T_{measure_SCC_FS3_CRS}$ for the measurements at the UE due to the absence of the necessary radio signals from the cell.

**Table 8.12.2.4.1-1: Cell identification with deactivated SCell on SCC under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{identify_SCC_FS3}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | (7+L)*k1*k2**measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (25+L)*k1*k2**measCycleSCell* |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | (3+L)*k1*k2**measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (9+L)*k1*k2**measCycleSCell* |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that L is such that the cell identification period $T_{identify_SCC_FS3}$ does not exceed 75*k1*k2**measCycleSCell.*

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_SCC_FS3}$:

- RSRP related side condition given in Section 9.1.19 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Table 8.12.2.4.1-1.

The measurement period for deactivated SCell measurements is $T_{measure_SCC_FS3_CRS}$ according to the parameter *measCycleSCell* shown in Table 8.12.2.4.1-1.

**Table 8.12.2.4.1-2: Measurement requirements on SCC with deactivated SCell under operation with frame structure 3 with deactivated SCell**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{measure_SCC_FS3_CRS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | *(5+M)*k1*k2*measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | *(20+M)*k1*k2*measCycleSCell* |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | *(1+M)*k1*k2*measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | *(4+M)*k1*k2*measCycleSCell* |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that M is such that the time period $T_{measure_SCC_FS3_CRS}$ for measurements does not exceed 60*k1*k2**measCycleSCell*.

The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers within the measurement period of $T_{measure_SCC_FS3_CRS}$.

The measurement accuracy for all measured cells shall be as specified in Section 9.1.19.

A UE may reconfigure the receiver bandwidth or turn on/off one of the RF chains when performing measurements on one SCC with deactivated SCell. This may cause interruptions on PCell that are specified in Section 7.8.

#### 8.12.2.4.1.1 Measurement Reporting Requirements

##### 8.12.2.4.1.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.

##### 8.12.2.4.1.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.

The first report in event triggered periodic CRS based measurement reporting shall meet the requirements specified in Section 8.12.2.4.1.1.3.

##### 8.12.2.4.1.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in Section 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_SCC_FS3}$ defined in Section 8.12.2.4.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_SCC_FS3}$ defined in Section 8.12.2.4.1 becomes undetectable for a period $\leq$ 8 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_SCC_FS3_CRS}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

### 8.12.2.4.2 E-UTRAN secondary component carrier measurements when common DRX is used

When DRX is in use the UE shall be able to identify a new detectable FS3 cell on a secondary component carrier within the cell identification time $T_{identify_SCC_FS3_DRX}$, according to the parameter *measCycleSCell* , where the cell identification time of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_SCC_FS3_CRS_DRX}$.

$T_{identify_SCC_FS3_DRX}$ is the time period for cell identification as shown in Table 8.12.2.4.2-1,

$T_{measure_SCC_FS3_CRS_DRX}$ is the time period for measurements as shown in Table 8.12.2.4.2-2,

$T_{DMTC_periodicity}$ is the discovery signal measurement timing configuration periodicity of higher layer,

L is the number of configured discovery signal occasions during ON DURATION and which are not available during $T_{identify_SCC_FS3_DRX}$ for cell identification at the UE due to the absence of the necessary radio signals from the cell,

M is the number of configured discovery signal occasions during ON DURATION and which are not available during $T_{measure_SCC_FS3_CRS_DRX}$ for the measurements at the UE due to the absence of the necessary radio signals from the cell.

**Table 8.12.2.4.2-1: Cell identification on SCC with deactivated SCell under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{identify_SCC_FS3_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | *(7+L)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | *(25+L)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | *(3+L)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | *(9+L)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell during ON DURATION or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that L is such that the cell identification period $T_{identify_SCC_FS3_DRX}$ does not exceed 75*k1*k2*Max{*measCycleSCell*, DRX cycle length}.

A cell shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_SCC_FS3_DRX}$:

- RSRP related side condition given in Section 9.1.19 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Table 8.12.2.4.2-1.

The measurement period for deactivated scell measurements is $T_{measure_SCC_FS3_CRS_DRX}$ according to the parameter *measCycleSCell* shown in Table 8.12.2.4.2-2.

**Table 8.12.2.4.2-2: Measurement requirements on SCC with deactivated SCell under operation with frame structure 3**

| SCH Ês/Iot | CRS measurement bandwidth [RB] Note2 | CRS Ês/Iot | $T_{measure_SCC_FS3_CRS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | -6 ≤ CRS Ês/Iot | *(5 +M)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |

| | | | |
|---|---|---|---|
| -6 ≤ SCH Ês/Iot < 0 | <25 | | *(20+M)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CRS Ês/Iot | *(1+M)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | *(4+M)* k1*k2**Max{*measCycleSCell*, DRX cycle length} |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured cell during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured cell during ON DURATION or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured cell not overlapping with the inter-frequeny measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that M is such that the time period $T_{measure_SCC_FS3_CRS_DRX}$ for measurements does not exceed 60*k1*k2*Max{*measCycleSCell*, DRX cycle length}.

The UE shall be capable of performing RSRP and RSRQ measurements for 3 identified cells on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_SCC_FS3_CRS_DRX}$.

The measurement accuracy for all measured cells shall be as specified in Section 9.1.19.

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, and when making measurements of cells on one SCC with deactivated SCell. This may cause interruptions (packet drops) to a PCell. No interruptions while the On Duration timer is running shall be allowed when common DRX is used. The requirement considers only interruptions due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

#### 8.12.2.4.2.1 Measurement Reporting Requirements

##### 8.12.2.4.2.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.

##### 8.12.2.4.2.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.12.2.4.2.1.3.

##### 8.12.2.4.2.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in Section 9.

The UE shall not send any event triggered CRS based measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_SCC_FS3}$ defined in Section 8.12.2.4.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_SCC_FS3_DRX}$ defined in Section 8.12.2.4.2 becomes undetectable for a period $\leq 8$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_SCC_FS3_CRS_DRX}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

## 8.12.3 Requirements for CSI-RS based discovery signal measurements for E-UTRA carrier aggregation

### 8.12.3.1 Introduction

The requirements in Section 8.12.3 shall apply for CSI-RS based discovery signal measurements comprising CSI-RSRP measurements [4].

### 8.12.3.2 Measurements of a secondary component carrier

A Secondary component carrier may be activated and deactivated by MAC-CE commands as specified in [17]. The applicable performance requirements depend on whether the SCell on the corresponding frequency is actived or deactivated.

### 8.12.3.3 Measurements of a secondary component carrier with active SCell

When the SCell is activated, measurement performance requirements for the frequency are those given in Section 8.11.3.1. If common DRX is in use, then the requirements for that secondary component carrier are given by the DRX requirements in Section 8.11.3.1.1.2, otherwise the non DRX requirements are applicable. The applicable measurement accuracy requirements are in Section 9.1.19.

### 8.12.3.4 Measurements of a secondary component carrier with deactivated SCell

This section defines the measurement requirements of a secondary component carrier with deactivated SCell based on the parameter *measCycleSCell* defined in TS 36.331 [2].

#### 8.12.3.4.1 E-UTRAN secondary component carrier measurements when no common DRX is used

When no DRX is in use the UE shall be able to identify a new detectable FS3 TP on a secondary component carrier within the cell identification time $T_{identify_SCC_TP_FS3}$, where the identification of a TP shall include cell identification and a single measurement on the TP within the measurement period $T_{measure_SCC_FS3_CSI\text{-}RS}$.

$T_{identify_SCC_TP_FS3} = T_{identify_SCC_FS3} + T_{measure_SCC_FS3_CSI\text{-}RS}$,

where:

$T_{identify_SCC_FS3}$ is the time period for cell identification in Section 8.12.2.4.1,

$T_{measure_SCC_FS3_CSI\text{-}RS}$ is the time period for TP measurement in Table 8.12.3.4.1-1,

M is the number of configured discovery signal occasions which are not available for the measurements at the UE during $T_{measure_SCC_FS3_CSI\text{-}RS}$ due to the absence of the necessary radio signals from the cell.

During $T_{identify_SCC_TP_FS3}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

**Table 8.12.3.4.1-1: Measurement requirements for a TP on SCC with deactivated SCell under operation with frame structure 3**

| SCH Ês/Iot | CSI-RS measurement bandwidth [RB] Note2 | CSI-RS Ês/Iot | $T_{measure_SCC_FS3_CSI-RS}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤ CSI-RS Ês/Iot | (5+M) * k1*k2* *measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M) * k1*k2* *measCycleSCell* |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CSI-RS Ês/Iot | (1+M) * k1*k2* *measCycleSCell* |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M) * k1*k2* *measCycleSCell* |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured TP; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured TP or when the UE does not require the measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured TP not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that M is such that the time period $T_{measure_SCC_FS3_CSI-RS}$ for TP measurement does not exceed 60*k1*k2* *measCycleSCell.*

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_SCC_TP_FS3}$:

- CSI-RSRP related side condition given in Section 9.1.19 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is accordin g to Table 8.12.2.4.1-1.

The UE shall be capable of performing RSRP measurements for 3 identified TPs on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_SCC_FS3_CSI-RS}$.

The measurement accuracy for all measured TPs shall be as specified in Section 9.1.19.

A UE may reconfigure the receiver bandwidth or turn on/off one of the RF chains when performing measurements on one SCC with deactivated SCell. This may cause interruptions on PCell that are specified in Section 7.8.

#### 8.12.3.4.1.1 Measurement Reporting Requirements

##### 8.12.3.4.1.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.

##### 8.12.3.4.1.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.12.3.4.1.1.3.

##### 8.12.3.4.1.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in Section 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_SCC_TP_FS3}$ defined in Section 8.12.3.4.1. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_SCC_TP_FS3}$ defined in Section 8.12.3.4.1 becomes undetectable for a period $\leq 8$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_SCC_FS3_CSI\text{-}RS}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

### 8.12.3.4.2 E-UTRAN secondary component carrier measurements when common DRX is used

When DRX is in use the UE shall be able to identify a new detectable FS3 TP on a secondary component carrier within $T_{identify_SCC_TP_FS3_DRX}$, according to the parameter *measCycleSCell*, where the identification of a TP shall include cell identification and a single measurement on the TP within the measurement period $T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$.

$T_{identify_SCC_TP_FS3_DRX} = T_{identify_SCC_FS3_DRX} + T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$,

where:

$T_{identify_SCC_FS3_DRX}$ is the time period for cell identification in Section 8.12.2.4.2,

$T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$ is the time period for TP measurement in Table 8.12.3.4.2-1,

M is the number of configured discovery signal occasions during ON DURATION and which are not available during $T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$ for the measurements at the UE due to the absence of the necessary radio signals from the cell.

During $T_{identify_SCC_TP_FS3_DRX}$ over multiple discovery signal occasions, the UE may assume the following:

- in all the discovery signal occasions, which are available at the UE, the corresponding necessary cell-specific discovery signals are always available from the same set of TPs in the measured cell, and
- in all the discovery signal occasions, which are not available at the UE, the corresponding necessary cell-specific discovery signals are not available from any TP within the same measured cell.

**Table 8.12.3.4.2-1: Measurement requirements for a TP on SCC with deactivated SCell under operation with frame structure 3**

| SCH Ês/Iot | CSI-RS measurement bandwidth [RB] Note2 | CSI-RS Ês/Iot | $T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$ [ms] |
|---|---|---|---|
| 0 ≤ SCH Ês/Iot | <25 | 0 ≤ CSI-RS Ês/Iot | (5+M) * k1*k2*Max{ *measCycleSCell*, DRX cycle length } |
| -6 ≤ SCH Ês/Iot < 0 | <25 | | (20+M) * k1*k2*Max{ *measCycleSCell*, DRX cycle length } |
| 0 ≤ SCH Ês/Iot | ≥25 | 0 ≤ CSI-RS Ês/Iot | (1+M) * k1*k2*Max{ *measCycleSCell*, DRX cycle length } |
| -6 ≤ SCH Ês/Iot < 0 | ≥25 | | (4+M) * k1*k2*Max{ *measCycleSCell*, DRX cycle length } |

Note 1: Discovery signal occasion duration (*ds-OccasionDuration*) is 1 ms.

Note 2: The requirements for measurement bandwidth ≥25 RB are optional.

Note 3: k1=2 when the measurement gaps configured for inter-frequency measurements in DMTC occasions or for inter-frequency RSSI measurements in RMTC occasions on a carrier with frame structure 3 overlap with some but not all DMTC occasions of the measured TP during ON DURATION; otherwise, k1=1, e.g., when measurement gaps configured for inter-frequency measurements on a carrier with frame structure 3 do not overlap with DMTC occasions of the measured TP during ON DURATION or when the UE does not require the

measurement gaps for the inter-frequency measurements. The requirements apply, provided that the inter-frequency measurement gap pattern does not overlap with all DMTC occasions of the measured cell.

k2= $\max\left(2, \left\lceil \frac{N_{FS3_SCC}}{2} \right\rceil\right)$ when DMTC occasions in the measured TP not overlapping with the inter-frequency measurement gaps overlap with DMTC occasions of $N_{FS3_SCC}$ ($N_{FS3_SCC}$>0) SCells during ON DURATION on other FS3 carriers; otherwise, k2=1, e.g., when $N_{FS3_SCC}$=0.

Note 4: The requirements apply, provided that M is such that the time period $T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$ for TP measurement does not exceed 60*k1*k2*Max{*measCycleSCell*, DRX cycle length}.

A TP shall be considered detectable when the following conditions are met during the discovery signal occasions which are available during $T_{identify_SCC_TP_FS3_DRX}$:

- CSI-RSRP related side condition given in Section 9.1.19 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ is according to Annex B.2.12 for a corresponding Band and SCH Ês/Iot is according to Table 8.12.2.4.2-1.

The UE shall be capable of performing CSI-RSRP measurements for 3 identified TPs on a secondary component carrier, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_SCC_FS3_CSI\text{-}RS_DRX}$.

The measurement accuracy for all measured TPs shall be as specified in Section 9.1.19.

A UE may reconfigure receiver bandwidth taking into account the SCell activation/deactivation status, and when making measurements of TPs on one SCC with deactivated SCell. This may cause interruptions (packet drops) to a PCell. No interruptions while the On Duration timer is running shall be allowed when common DRX is used. The requirement considers only interruptions due to reconfiguration of the receiver bandwidth, and not due to other causes such as RF impairments or channel conditions.

#### 8.12.3.4.2.1 Measurement Reporting Requirements

##### 8.12.3.4.2.1.1 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in Section 9.

##### 8.12.3.4.2.1.2 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in Section 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in Section 8.12.3.4.2.1.3.

##### 8.12.3.4.2.1.3 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in Section 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which is caused by no UL resources for UE to send the measurement report or by the LBT procedure performed by the UE in order to determine that the channel is clear for performing uplink transmission.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_SCC_TP_FS3_DRX}$ defined in Section 8.12.3.4.2. When L3 filtering is used or IDC autonomous denial is configured or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

If a TP which has been detectable at least for the time period $T_{identify_SCC_TP_FS3_DRX}$ defined in Section 8.12.3.4.2 becomes undetectable for a period $\leq 8$ seconds and then the TP becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{identify_SCC_FS3_CSI\text{-}RS_DRX}$ provided the timing to that TP has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or LBT is performed by the UE on the carrier used for the measurement reporting an additional delay can be expected.

# 8.13 Measurements for UE Category M1

## 8.13.1 Introduction

The UE category M1 applicability of the requirements in subclause 8.13 is defined in Section 3.6.

This clause contains requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are specified for E-UTRA intra frequency measurements. These measurements may be used by the E-UTRAN, e.g. for handover decisions. The measurement quantities are defined in TS 36.214 [4], the measurement model is defined in TS 36.302 [22] and measurement accuracies are specified in clause 9. Control of measurement reporting is specified in TS 36.331 [2].

The UE shall meet the requirements in Section 8.13, provided:

- the UE does not require measurement gaps for the corresponding measurements, or
- the UE requires measurement gaps for the corresponding measurements and is configured with the measurement gap pattern Id 0 or 1 and is not configured with any measurement gap pattern from Table 8.1.2.1-3.

If the UE requires measurement gaps for the corresponding measurements and is configured with the measurement gap pattern from Table 8.1.2.1-3, the UE is not required to perform any RRM measurements that requires gaps during the RSTD measurement period and the requirement in Section 8.13 shall not apply during the RSTD measurement period.

When the UE is provided with IDC solution, the UE shall also perform RRM measurements and meet the corresponding requirements in clause 8.

## 8.13.2 Requirements for UE category M1 with CE mode A

The UE category M1 applicability of the requirements in subclause 8.13.2 is defined in Section 3.6. The requirements defined in clause 8.13.2 apply provided the following conditions are met:

- UE is configured with measurement gap pattern ID#0 or ID#1 defined in Table 8.1.2.1-1.

Alternatively, the UE shall meet the requirements in subclause 8.13.2 defined for gap pattern ID#0 without using any measurement gaps provided:

- UE indicates it does not need gaps with the capability intraFreq-CE-NeedForGaps-r13 [2, TS 36.331] for the frequency band of the serving cell, or
- UE is not configured with any reporting configuration that requires measurement on any intra-frequency neighbour cell.

### 8.13.2.1 E-UTRAN intra frequency measurements by UE category M1 with CE mode A

The UE shall be able to identify new intra-frequency cells and perform RSRP and RSRQ measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency cells and additionally search for and identify new intra frequency cells.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- If measurement gaps are configured, the measured subframes containing RSS are available before or after the measurement gaps and UE shall measure RSS outside the gaps, and
- RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH if UE supports measuring neighbour cell RSS in the same MPDCCH bandwidth, or within the same RSS RB location

of the serving cell if UE does not support measuring neighbour cell RSS in the same MPDCCH bandwidth, for 3 successive DRX cycles or MPDCCH monitoring cycles and the last subframe of the RSS occasion of the measured cell is in the window of [n-5, n-1] where n is the first subframe of DRX ON duration or MPDCCH monitoring occasion, and

- RSS-based measurement period ($T_{measure_intra_UE\ cat\ M1}$) is not longer than CRS-based measurement period, and
- RSS power offset ($P_{RSS}$) with respect to CRS as defined in *RSS-Config* or *rss-MeasPowerBias* [2], where $P_{RSS} \geq$ 0 dB.
- RSRQ is not configured as trigger quantity or report quantity for intra-frequency measurement

If UE performs RSRP measurement based on RSS for serving or neighbour cell, it is not expected to perform RSRP measurement based on CRS on that cell. UE shall compensate the RSS power offset ($P_{RSS}$) with respect to CRS when derving the RSRP measurement based on RSS.

For performing RSRP measurement based on RSS on detected intra-frequency cells, UE assumes BL/CE DL subframe configuration of each neighbor cell is same as serving cell. The requirements for RSRP measurement based on RSS for a neighbour cell apply provided that BL/CE DL subframe configuration of the neighbor cell is same as serving cell.

Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the RSS transmission of each neighbor cell starts in the radio frame within a window of +/- 5ms around the calculated radio frame offset of the serving cell.

### 8.13.2.1.1 E-UTRAN FDD intra frequency measurements

#### 8.13.2.1.1.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify and measure a new detectable FDD intra frequency cell according to requirements in Table 8.13.2.1.1.1-1 when SCH Ês/Iot >= -6 dB, provided

- G=1, or
- $r_{max}$*G < 80ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.2.1.1.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.2.1.1.1-1: Requirement on cell identification delay and measurement delay for FDD intrafrequency cell**

| Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|
| 0 | 1.44 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 480 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | 2.88 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 960 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| N/A | N/A | 3 x TRSS (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

$K_{intra_M1_NC}$ = 100 / X where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.2.1.1.1-2 when *highSpeedMeasGapCE-ModeA* [2] is not configured, and in Table 8.13.2.1.1.1-2A when *highSpeedMeasGapCE-ModeA* [2] is configured. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1. When inter frequency measurement is not configured, $K_{intra_M1_NC}$=1 regardless whether or how parameter measGapSharingScheme [2] is configured.

**Table 8.13.2.1.1.1-2: Value of parameter X for CEModeA**

| *measGapSharingScheme* | Value of X (%) |
|---|---|

| | |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 40 |
| '10' | 50 |
| '11' | 60 |

**Table 8.13.2.1.1.1-2A: Value of parameter X for CEModeA for UE configured with *highSpeedMeasGapCE-ModeA***

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 80 |
| '11' | 90 |

**Table 8.13.2.1.1.1-3: Requirement on cell identification delay and measurement delay for FDD intrafrequency cell with MPDCCH scaling**

| Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|
| 0 | Max(20 * $r_{max}$*G / 1000, 1.44) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 480) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | Max(20 * $r_{max}$*G / 1000, 2.88) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 960) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| N/A | N/A | Max($r_{max}$*G, $T_{RSS}$) x 3 (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

$$K_{RSTD_M1_NC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$
- PRS bandwidth is less than the bandwidth of the cell used for RSTD measurement in which case gaps are required

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_NC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.1 and 9.1.21.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_intra_UE\ cat\ M1}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is according to Table 8.13.2.1.1.1-1. When measurement gaps are activated the UE shall be capable of performing measurements for at least 6 cells. If the UE has identified more than 6 cells, the UE shall perform measurements but the reporting rate of RSRP and RSRQ measurement of cells from UE physical layer to higher layers may be decreased.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.1 and 9.1.21.2.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.6.

#### 8.13.2.1.1.1.1 Measurement Reporting Requirements

##### 8.13.2.1.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

##### 8.13.2.1.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.1.1.1.1.3.

##### 8.13.2.1.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.1.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_NC}$ defined in clause 8.13.2.1.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_UE\ cat\ M1,\ Intra}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.2.1.1.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_NC}$ as shown in table 8.13.2.1.1.2-1.

When eDRX_CONN is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_NC}$ as shown in table 8.13.2.1.1.2-1A.

**Table 8.13.2.1.1.2-1: Requirement to identify a newly detectable FDD intrafrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |

| | | |
|---|---|---|
| | 0.128<DRX-cycle≤2.56 | Note 2(20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.128 | 2.88 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.1.1.2-1A: Requirement to identify a newly detectable FDD intrafrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.1 and 9.1.21.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14-1 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.1.2-2. When eDRX_CONN is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.1.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 6 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1}$.

**Table 8.13.2.1.1.2-2: Requirement to measure FDD intrafrequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.128 | 0.48 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note1) |
| | 0.128≤DRX-cycle≤2.56 | Note 2 (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.256 | 0.960 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.256≤DRX-cycle≤2.56 | Note 2 (*$K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| N/A | N/A | Max(DRX cycle length, $T_{RSS}$ ) x 3(Note 3) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use<br>Note 3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

**Table 8.13.2.1.1.2-3: Requirement to measure FDD intrafrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.1 and 9.1.21.2.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.6.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

8.13.2.1.1.2.1 Measurement Reporting Requirements

8.13.2.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

#### 8.13.2.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.1.1.2.1.3.

#### 8.13.2.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra,\ UE\ cat\ M1}$ defined in Clause 8.13.2.1.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_NC}$ defined in clause 8.13.2.1.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.1.2 E-UTRAN intra frequency measurements for HD-FDD

#### 8.13.2.1.2.1 E-UTRAN intra frequency measurements when no DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.2.1.1.1 also apply for this section provided the following conditions are met:

- at least downlink subframe # 0 or downlink subframe # 5 per radio frame of an intra-frequency cell to be identified by the UE is available at the UE over $T_{identify_intra_UE\ cat\ M1}$;
- at least one downlink subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell over $T_{measure_intra_UE\ cat\ M1}$.
- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

#### 8.13.2.1.2.2 E-UTRAN intra frequency measurements when DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

When DRX is in use the UE shall be able to identify a new detectable HD-FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_NC}$ as shown in table 8.13.2.1.2.2-1.

When eDRX_CONN is in use, the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_NC}$ as shown in table 8.13.2.1.2.2-1A.

**Table 8.13.2.1.2.2-1: Requirement to identify a newly detectable HD-FDD intrafrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (32 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2 (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | ≤0.08 | 2.88 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (32 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2 (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.1.2.2-1A: Requirement to identify a newly detectable HD-FDD intrafrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.1 and 9.1.21.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.2.2-2. When eDRX_CONN is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.2.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 6 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1}$.

**Table 8.13.2.1.2.2-2: Requirement to measure HD-FDD intrafrequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.08 | 0.48 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.08≤DRX-cycle≤0.16 | Note 2 (7 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.16<DRX-cycle≤2.56 | Note 2 (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.16 | 0.96 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | DRX-cycle=0.16 | 1.12 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (7 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.16<DRX-cycle≤2.56 | Note 2 (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| N/A | N/A | Max(DRX cycle length, $T_{RSS}$ ) x 3 (Note 3) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use<br>Note 3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

**Table 8.13.2.1.2.2-3: Requirement to measure HD-FDD intrafrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.1 and 9.1.21.2.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.6.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

#### 8.13.2.1.2.2.1 Measurement Reporting Requirements

##### 8.13.2.1.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

##### 8.13.2.1.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2, and 9.1.21.6.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.1.2.2.1.3.

##### 8.13.2.1.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.1.2.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_NC}$ defined in clause 8.13.2.1.2.2 becomes undetectable for a period $\leq$ 5 seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.1.3 E-UTRAN TDD intra frequency measurements

#### 8.13.2.1.3.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use, the UE shall be able to identify and measure a new detectable TDD intra frequency cell according to requirements in Table 8.13.2.1.3.1-1 when SCH Ês/Iot >= -6 dB, provided

- G=1, or
- $r_{max}$*G < 80ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.2.1.3.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.2.1.3.1-1: Requirement on cell identification delay and measurement delay for TDD intrafrequency cell**

| Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|
| 0 | 1.44 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 480 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | 2.88 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 960 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| N/A | N/A | 3 x TRSS (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

$K_{intra_M1_NC}$ = 100 / X where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.2.1.3.1-2 when *highSpeedMeasGapCE-ModeA* [2] is not configured, and in Table 8.13.2.1.3.1-2A when *highSpeedMeasGapCE-ModeA* [2] is configured. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1. When inter frequency measurement is not configured, $K_{intra_M1_NC}$=1 regardless whether or how parameter measGapSharingScheme [2] is configured.

**Table 8.13.2.1.3.1-2: Value of parameter X for CEModeA**

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 40 |
| '10' | 50 |
| '11' | 60 |

**Table 8.13.2.1.3.1-2A: Value of parameter X for CEModeA for UE configured with *highSpeedMeasGapCE-ModeA***

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 80 |
| '11' | 90 |

**Table 8.13.2.1.3.1-3: Requirement on cell identification delay and measurement delay for TDD intrafrequency cell with MPDCCH scaling**

| Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|
| 0 | Max(20 * $r_{max}$*G / 1000, 1.44) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 480) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | Max(20 * $r_{max}$*G / 1000, 2.88) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 960) * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| N/A | N/A | Max($r_{max}$*G, $T_{RSS}$) x 3 (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

$$K_{RSTD_M1_NC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$
- PRS bandwidth is less than the bandwidth of the cell used for RSTD measurement in which case gaps are required

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],

- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_NC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.1 and 9.1.21.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_intra_UE\ cat\ M1}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is according to Table 8.13.2.1.3.1-1. When measurement gaps are activated the UE shall be capable of performing measurements for at least 6 cells. If the UE has identified more than 6 cells, the UE shall perform measurements but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.1 and 9.1.21.2.

The RSRQmeasurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.6.

#### 8.13.2.1.3.1.1 Measurement Reporting Requirements

##### 8.13.2.1.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

##### 8.13.2.1.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.1.3.1.1.3.

##### 8.13.2.1.3.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.1.3.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_NC}$ defined in clause 8.13.2.1.3.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Intra_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

8.13.2.1.3.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_UE\ catM1}$ as shown in table 8.13.2.1.3.2-1.

When eDRX_CONN is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_NC}$ as shown in table 8.13.2.1.3.2-1A.

**Table 8.13.2.1.3.2-1: Requirement to identify a newly detectable TDD intrafrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2 (20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.128 | 2.88 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128 | 3.2 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (25 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2 (20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.1.3.2-1A: Requirement to identify a newly detectable TDD intrafrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (20 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.21.1 and 9.1.21.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.6 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.3.2-2. When eDRX_CONN is used, $T_{measure_intra_UE\ cat\ M1_NC}$ is as specified in table 8.13.2.1.3.2-3. The UE shall be capable of performing RSRP and RSRQ measurements for 6 identified intra-frequency cells and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1}$.

**Table 8.13.2.1.3.2-2: Requirement to measure TDD intra frequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.128 | 0.48 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128≤DRX-cycle≤2.56 | Note 2 (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.256 | 0.96 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.256≤DRX-cycle≤2.56 | Note 2 (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| N/A | N/A | Max(DRX cycle length, $T_{RSS}$ ) x 3 (Note 3) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use<br>Note 3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | |

**Table 8.13.2.1.3.2-3: Requirement to measure TDD intra frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{intra_M1_NC}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.1 and 9.1.21.2.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.6.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

#### 8.13.2.1.3.2.1 Measurement Reporting Requirements

##### 8.13.2.1.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

##### 8.13.2.1.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.1.3.2.1.3.

##### 8.13.2.1.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.1, 9.1.21.2 and 9.1.21.6.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.1.3.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_NC}$ defined in clause 8.13.2.1.3.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.2 Void

### 8.13.2.3 E-UTRAN OTDOA Intra-Frequency RSTD Measurements for Cat-M1 UE in CEModeA

All intra-frequency RSTD measurement requirements specified in Sections 8.13.2.3 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2]. All the measurement requirements specified in Sections 8.13.2.3 shall apply provided that the UE is configured:

- with the single PRS configuration for the reference cell and all the neighbour cells and
- with either the measurement gap pattern ID #0 specified in Clause 8.1.2.1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 for cat M1 RSTD measurements if the PRS bandwidth is less than the bandwidth of the cell used for the RSTD measurement in which case gaps are required

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.13.2.3.1 E-UTRAN FDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqFDD,Cat_M}$ ms as given below (see also Figure 8.13.2.3.1-1):

$$T_{RSTDIntraFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDIntraFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.13.2.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24],

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{actual_PR} = N_{PRS}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{actual_PR}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{actual_PR}$ = (MGL-2) if MGRP≥ $N_{PRS}$ >(MGL-2), $N_{actual_PR}$ = $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$ if $N_{PRS}$ >MGRP, and $N_{actual_PR} = N_{PRS}$ if $N_{PRS}$ ≤(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.20.

$T_{PRS}$ $N_{PRS}$, $N_{actual_PR}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

Editor's note: Requirements have assumed that prsOccGroupLength is not configured in the measurement period.

**Table 8.13.2.3.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |

| | | |
|---|---|---|
| >160 ms | $8 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqFDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\,\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\,\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

$PRP\ 1,2|_{dBm}$ according to Annex B.2.22 for a corresponding Band

$PRS\hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqFDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.13.2.3.1-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.20.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDIntraFreqFDD,Cat_M,HO}$ ) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,Cat_M,HO} = T_{RSTDIntraFreqFDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,Cat_M,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

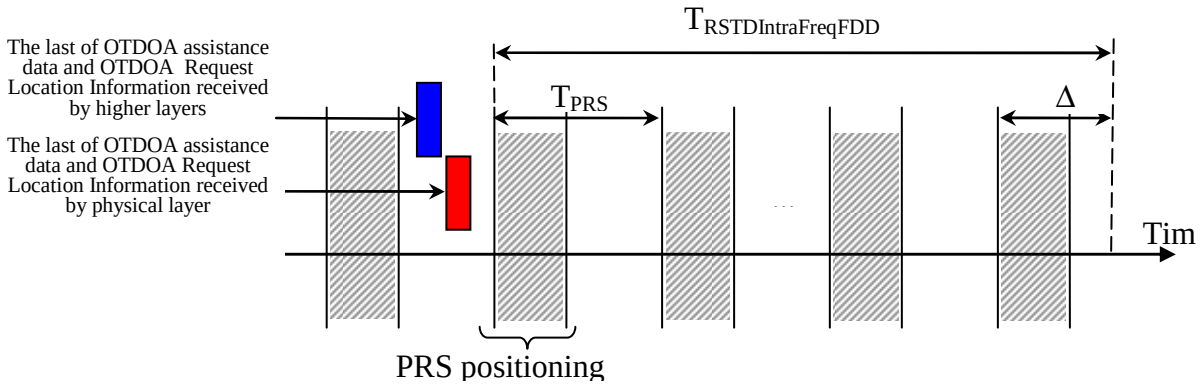


**Figure 8.13.2.3.1-1: Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.13.2.3.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.20.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqFDD,Cat_M}$ defined in Clause 8.13.2.3.1.

### 8.13.2.3.2 E-UTRAN TDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDIntraFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB},$$

where

$T_{RSTDIntraFreqTDD,Cat_M}$ is the total time for detecting and measuring at least $n$ cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.13.2.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24],

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{actual_PRS} = N_{PRS}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{actual_PRS}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{actual_PRS}$ = (MGL-2) if MGRP$\geq N_{PRS}$>(MGL-2), $N_{actual_PRS} = (MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$ if $N_{PRS}$>MGRP, and $N_{actual_PRS} = N_{PRS}$ if $N_{PRS} \leq$(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.20.

$T_{PRS}$ $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.2.3.1-1: Number of PRS positioning occasions within $T_{RSTDIntraFreq\,TDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreq\,TDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\ \hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\ \hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.22 for a corresponding Band

$\hat{PRSE}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.20.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDIntraFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqTDD,Cat_M,HO} = T_{RSTDIntraFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.13.2.3.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.13.2.3.2-2.

**Table 8.13.2.3.2-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.13.2.3.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.20.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqTDD,Cat_M}$ defined in Clause 8.13.2.3.2.

#### 8.13.2.3.3 E-UTRAN HD-FDD Intra-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.2.3.1 also apply for this section except the reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.21.20 are available for RSTD measurements in the measured and reference cells.

##### 8.13.2.3.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.20.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period defined in Clause 8.13.2.3.3.

### 8.13.2.4 E-UTRAN OTDOA Inter-Frequency RSTD Measurements for Cat-M1 UE in CEModeA

All inter-frequency RSTD measurement requirements specified in Sections 8.13.2.4 shall apply, provided that

- the UE is capable of inter-frequency RSTD measurements for OTDOA [24], and
- either the measurement gap pattern ID # 0 specified in Table 8.1.2.1-1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 is used or the UE supports capability of conducting inter-frequency measurements without gaps.

All inter-frequency RSTD measurement requirements specified in Sections 8.13.2.4 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.21.17 are available for RSTD measurements in the measured and reference cell.

All the measurement requirements specified in Sections 8.13.2.4 shall apply provided that the UE is configured with the single PRS configuration for the reference cell and all the neighbour cells.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.13.2.4.1 E-UTRAN FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqFDD,Cat_M}$ ms as given below (see also Figure 8.13.2.3.1-1):

$$T_{RSTDInterFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24]; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.13.2.4.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$>(MGL-2ms), $N_{actual_PRS}$ =(MGL-2ms); if $N_{PRS}$>MGRP, $N_{actual_PRS}$ = $(MGL-2)\cdot\left\lfloor N_{PRS}/MGRP \right\rfloor$; $N_{actual_PRS} = N_{PRS}$ if $N_{PRS}$≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.17.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.2.4.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16\cdot\left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $32\cdot\left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| >160 ms | $8\cdot\left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $16\cdot\left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\ \hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.20 for a corresponding Band

$\text{PRS}\hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{\text{RSTDInterFreqTDD,Cat_M}}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.17.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$ ) shall be according to the following expression:

$$T_{\text{RSTDInterFreqTDD,Cat_M,HO}} = T_{\text{RSTDInterFreqTDD,Cat_M}} + K \times T_{\text{PRS}} + T_{\text{HO}} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$.

$T_{\text{HO}}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.13.2.4.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.17.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $\text{TTI}_{\text{DCCH}}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $\text{TTI}_{\text{DCCH.}}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{\text{RSTDInterFreqTDD,Cat_M}}$ defined in Clause 8.13.2.4.1.

### 8.13.2.4.2 E-UTRAN TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells,

including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24]; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.13.2.4.2-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$>(MGL-2ms), $N_{actual_PRS}$ =(MGL-2ms); if $N_{PRS}$>MGRP, $N_{actual_PRS}$ = $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$; $N_{actual_PRS}$ = $N_{PRS}$ if $N_{PRS}$≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.17.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.2.4.2-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f21 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\,\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\,\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.20 for a corresponding Band

$PRS\hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDInterFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.17.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqTDD,Cat_M,HO}$ ) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,Cat_M,HO} = T_{RSTDInterFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The inter-frequency requirements in this clause (8.13.2.4.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.13.2.4.2-2.

**Table 8.13.2.4.2-2: TDD uplink-downlink subframe configurations applicable for TDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

### 8.13.2.4.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.17.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDInterFreqTDD,Cat_M}$ defined in Clause 8.13.2.4.2.

#### 8.13.2.4.3 E-UTRAN HD-FDD Inter-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.2.4.1 also apply for this section except reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.21.17 are available for RSTD measurements in the measured and reference cells.

##### 8.13.2.4.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.17.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period as defined in Clause 8.13.2.4.3.

### 8.13.2.5 E-UTRAN E-CID Measurements Requirements for UE category M1 with CE mode A

#### 8.13.2.5.1 Intra-frequency FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

##### 8.13.2.5.1.1 Introduction

The requirements in section 8.13.2.5.1 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN FDD intra-frequency RSRP and RSRQ measurements [24].

##### 8.13.2.5.1.2 Measurement Requirements

The requirements in section 8.13.2.1.1 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.1.3.

##### 8.13.2.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of

the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.1, 9.1.21.2 and 9.1.21.6.

### 8.13.2.5.2 Intra-frequency HD-FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

#### 8.13.2.5.2.1 Introduction

The requirements in section 8.13.2.5.2 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN HD-FDD intra-frequency RSRP and RSRQ measurements [24].

#### 8.13.2.5.2.2 Measurement Requirements

The requirements in section 8.13.2.1.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.2.3.

#### 8.13.2.5.2.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.1, 9.1.21.2 and 9.1.21.6.

### 8.13.2.5.3 Intra-frequency TDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

#### 8.13.2.5.3.1 Introduction

The requirements in section 8.13.2.5.3 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN TDD intra-frequency RSRP and RSRQ measurements [24].

#### 8.13.2.5.3.2 Measurement Requirements

The requirements in section 8.13.2.1.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.3.3.

#### 8.13.2.5.3.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.1, 9.1.21.2 and 9.1.21.6.

### 8.13.2.5.4 Inter-frequency FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

#### 8.13.2.5.4.1 Introduction

The requirements in section 8.13.2.5.4 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN FDD inter-frequency RSRP and RSRQ measurements [24].

#### 8.13.2.5.4.2 Measurement Requirements

The requirements in section 8.13.2.6.1 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.4.3.

#### 8.13.2.5.4.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

### 8.13.2.5.5 Inter-frequency HD-FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

#### 8.13.2.5.5.1 Introduction

The requirements in section 8.13.2.5.5 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN HD-FDD inter-frequency RSRP and RSRQ measurements [24].

#### 8.13.2.5.5.2 Measurement Requirements

The requirements in section 8.13.2.6.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.5.3.

#### 8.13.2.5.5.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

### 8.13.2.5.6 Inter-frequency TDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeA

#### 8.13.2.5.6.1 Introduction

The requirements in section 8.13.2.5.6 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN TDD inter-frequency RSRP and RSRQ measurements [24].

#### 8.13.2.5.6.2 Measurement Requirements

The requirements in section 8.13.2.6.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.2.5.6.3.

#### 8.13.2.5.6.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

### 8.13.2.5.7 E-UTRAN FDD UE Rx-Tx Time Difference Measurements for UE category M1 in CEModeA

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 480 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_FDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.13.2.5.7-1.

**Table 8.13.2.5.7-1: FDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_FDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| < 0.128 | 0.48 (Note1) |
| 0.128 ≤ DRX-cycle ≤ 2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_FDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_FDD_UE_Rx_Tx3} = (K+1)*(T_{measure_FDD_UE_Rx_Tx1}) + K*T_{PCcell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_FDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.21.19.

If CRS muting is enabled in a cell for which the UE performs UE Rx-Tx time difference measurement, the UE capable of supporting CRS muting [31] shall perform the UE Rx-Tx time difference measurements and meet all the requirements in this section, provided the CRS are available within UE bandwiwidth in the serving cell during the UE Rx-Tx time difference measurement period.

#### 8.13.2.5.7.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.21.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.13.2.5.7.

### 8.13.2.5.8 E-UTRAN TDD UE Rx-Tx Time Difference Measurements for UE category M1 in CEModeA

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 480 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_TDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.13.2.5.8-1.

**Table 8.13.2.5.8-1: TDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_TDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| < 0.128 | 0.48 (Note1) |
| 0.128 ≤ DRX-cycle ≤ 2.56 | Note2 (5) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_TDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_TDD_UE_Rx_Tx3} = (K+1)*(T_{measure_TDD_UE_Rx_Tx1}) + K*T_{PCell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_TDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.21.19.

If CRS muting is enabled in a cell for which the UE performs UE Rx-Tx time difference measurement, the UE capable of supporting CRS muting [31] shall perform the UE Rx-Tx time difference measurements and meet all the requirements in this section, provided the CRS are available within UE bandwiwidth in the serving cell during the UE Rx-Tx time difference measurement period.

#### 8.13.2.5.8.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.21.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.13.2.5.8.

### 8.13.2.5.9 E-UTRAN HD-FDD UE Rx-Tx Time Difference Measurements for UE category M1 in CEModeA

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands.

The requirements defined in clause 8.13.2.5.7 also apply for this section except the measurement reporting requirements provided the following conditions are met:

- At least one downlink and one uplink subframes per radio frame are available for the UE Rx-Tx time difference measurement in the measured cell.
- at least downlink subframe # 0 or downlink subframe # 5 per radio frame of an intra-frequency cell to be identified by the UE is available at the UE;
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

#### 8.13.2.5.9.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.19.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.13.2.5.9.

### 8.13.2.6 E-UTRAN inter frequency measurements by UE category M1 with CE mode A

The UE shall be able to identify new inter-frequency cells and perform RSRP and RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided. During the RRC_CONNECTED state the UE shall continuously measure identified inter frequency cells and additionally search for and identify new inter frequency cells.

#### 8.13.2.6.1 E-UTRAN FDD - FDD inter frequency measurements

##### 8.13.2.6.1.1 E-UTRAN FDD - FDD inter frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify and measure a new detectable FDD inter-frequency cell according to requirements in Table 8.13.2.6.1.1-1 when SCH Ês/Iot >= -6 dB, provided

- G=1, or
- $r_{max}$*G < 80ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.2.6.1.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.2.6.1.1-1: Requirement on cell identification delay and measurement delay for FDD interfrequency cell**

| Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1_NC}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1_NC_NC}$) |
|---|---|---|
| 0 | 1.44 * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 480 * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | 2.88 * $K_{inter_M1_NC}$ seconds | 960 * $K_{inter_M1_NC}$ ms |

$$K_{inter_M1_NC} = \frac{N_{freq} * 100}{(100 - X)}$$

where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.2.6.1.1-2 when *highSpeedMeasGapCE-ModeA* [2] is not configured, and in Table 8.13.2.6.1.1-2A when *highSpeedMeasGapCE-ModeA* [2] is configured. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1.

**Table 8.13.2.6.1.1-2: Value of parameter X for CEModeA**

| *measGapSharingScheme* | Value of X (%) |
|---|---|

| | |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 40 |
| '10' | 50 |
| '11' | 60 |

**Table 8.13.2.6.1.1-2A: Value of parameter X for CEModeA for UE configured with *highSpeedMeasGapCE-ModeA***

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 80 |
| '11' | 90 |

**Table 8.13.2.6.1.1-3: Requirement on cell identification delay and measurement delay for FDD interfrequency cell with MPDCCH scaling**

| Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1}$) |
|---|---|---|
| 0 | Max(20 * $r_{max}$*G / 1000, 1.44) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 480) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | Max(20 * $r_{max}$*G / 1000, 2.88) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 960) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |

$$K_{RSTD_M1_NC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_NC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.9 and 9.1.22.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.1.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_inter_UE\ cat\ M1_NC}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for inter frequency measurements is according to Table 8.13.2.6.1.1-1. When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 2 FDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in Table 8.13.2.6.1.1-1.

#### 8.13.2.6.1.1.1 Measurement Reporting Requirements

##### 8.13.2.6.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

##### 8.13.2.6.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.6.1.1.1.3.

##### 8.13.2.6.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ inter_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.6.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_NC}$ defined in clause 8.13.2.6.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_UE\ cat\ M1_NC,\ Inter}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.2.6.1.2 E-UTRAN inter frequency measurements when DRX is used

When DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_NC}$ as shown in table 8.13.2.6.1.2-1.

When eDRX_CONN is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_NC}$ as shown in table 8.13.2.6.1.2-1A.

**Table 8.13.2.6.1.2-1: Requirement to identify a newly detectable FDD interfrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128 | 3.2 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (25 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(20 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |

| | | |
|---|---|---|
| 1 | <0.128 | 2.88 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128 | 3.2 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (25 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(20 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.1.2-1A: Requirement to identify a newly detectable FDD interfrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (20 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.9 and 9.1.21.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14-1 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_NC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.1.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.1.2-3.

**Table 8.13.2.6.1.2-2: Requirement to measure FDD interfrequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.128 | 0.48 * $K_{inter_M1\ cat\ M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128≤DRX-cycle≤2.56 | Note 2 (5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.256 | 0.960 * $K_{inter_M1\ cat\ M1_NC}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.256≤DRX-cycle≤2.56 | Note 2 (5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.1.2-3: Requirement to measure FDD interfrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.9 and 9.1.21.10.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.13 and 9.1.21.14.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

8.13.2.6.1.2.1 Measurement Reporting Requirements

8.13.2.6.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

8.13.2.6.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.6.1.2.1.3.

#### 8.13.2.6.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter,\ UE\ cat\ M1_NC}$ defined in Clause 8.13.2.6.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_NC}$ defined in clause 8.13.2.6.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.6.2 E-UTRAN inter-frequency measurements for HD-FDD

#### 8.13.2.6.2.1 E-UTRAN inter-frequency measurements when no DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.2.6.1.1 also apply for this section provided the following conditions are met:

- at least downlink subframe # 0 or downlink subframe # 5 per radio frame of an inter-frequency cell to be identified by the UE is available at the UE over $T_{identify_inter_UE\ cat\ M1_NC}$;
- at least one downlink subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell over $T_{measure_inter_UE\ cat\ M1_NC}$.
- RSRP related side conditions given in Sections 9.1.21.9 and 9.1.21.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.1.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

#### 8.13.2.6.2.2 E-UTRAN inter frequency measurements when DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

When DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_NC}$ as shown in table 8.13.2.6.2.2-1.

When eDRX_CONN is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_NC}$ as shown in table 8.13.2.6.2.2-1A.

**Table 8.13.2.6.2.2-1: Requirement to identify a newly detectable HD-FDD interfrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |

| | | |
|---|---|---|
| | 0.128 | 3.2 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (32 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(25 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| 1 | ≤0.08 | 2.88 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note1) |
| | 0.128 | 3.2 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (32 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(25 * $K_{inter_M}$ * $K_{RSTD_M1_NC\ 1}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.2.2-1A: Requirement to identify a newly detectable HD-FDD interfrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (25 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.9 and 9.1.21.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.1.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_NC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.2.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.2.2-3.

**Table 8.13.2.6.2.2-2: Requirement to measure HD-FDD interfrequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.08 | 0.48 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.08≤DRX-cycle≤0.16 | Note 2 (7 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.16<DRX-cycle≤2.56 | Note 2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.16 | 0.96 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | DRX-cycle=0.16 | 1.12 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (7 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.16<DRX-cycle≤2.56 | Note 2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.2.2-3: Requirement to measure HD-FDD interfrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.10 and 9.1.21.11.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.13 and 9.1.21.14.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

8.13.2.6.2.2.1 Measurement Reporting Requirements

8.13.2.6.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

#### 8.13.2.6.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.6.2.2.1.3.

#### 8.13.2.6.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.6.2.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_NC}$ defined in clause 8.13.2.6.2.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.6.3 E-UTRAN TDD inter frequency measurements

#### 8.13.2.6.3.1 E-UTRAN inter frequency measurements when no DRX is used

When no DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify and measure a new detectable TDD inter frequency cell according to requirements in Table 8.13.2.6.3.1-1 when SCH Ês/Iot >= -6 dB, provided

- G=1, or
- $r_{max}$*G < 80ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.2.6.3.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.2.6.3.1-1: Requirement on cell identification delay and measurement delay for TDD interfrequency cell**

| Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1_NC}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1_NC}$) |
|---|---|---|
| 0 | 1.44* $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 480* $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | 2.88* $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | 960* $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |

$$K_{inter_M1_NC} = \frac{N_{freq} * 100}{(100 - X)}$$

where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.2.6.3.1-2 when *highSpeedMeasGapCE-ModeA* [2] is not configured, and in Table 8.13.2.6.3.1-2A when *highSpeedMeasGapCE-ModeA* [2] is configured. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1.

**Table 8.13.2.6.3.1-2: Value of parameter X for CEModeA**

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 40 |
| '10' | 50 |
| '11' | 60 |

**Table 8.13.2.6.3.1-2A: Value of parameter X for CEModeA for UE configured with *highSpeedMeasGapCE-ModeA***

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 80 |
| '11' | 90 |

**Table 8.13.2.6.3.1-3: Requirement on cell identification delay and measurement delay for TDD interfrequency cell with MPDCCH scaling**

| Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1}$) |
|---|---|---|
| 0 | Max(20 * $r_{max}$*G / 1000, 1.44) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 480) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |
| 1 | Max(20 * $r_{max}$*G / 1000, 2.88) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ seconds | Max(5 * $r_{max}$*G, 960) * $K_{inter_M1_NC}$ * $K_{RSTD_M1_NC}$ ms |

$$K_{RSTD_M1_NC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS}$ > 40 ms
- $T_{PRS}$ > $N_{PRS}$

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_NC}$ = 1.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.9 and 9.1.21.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.1.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with measurement accuracy as specified in sub-clauses 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14 with measurement period ($T_{measure_inter_UE\ cat\ M1_NC}$) given by table 8.13.2.6.3.1-1:

The UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_NC}$.

#### 8.13.2.6.3.1.1 Measurement Reporting Requirements

##### 8.13.2.6.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

##### 8.13.2.6.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.6.3.1.1.3.

##### 8.13.2.6.3.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ inter_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.6.3.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_NC}$ defined in clause 8.13.2.6.3.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Inter_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.2.6.3.2 E-UTRAN inter frequency measurements when DRX is used

When DRX is in use and when DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable TDD inter frequency cell within $T_{identify_inter_UE\ catM1}$ as shown in table 8.13.2.6.3.2-1.

When eDRX_CONN is in use the UE shall be able to identify a new detectable TDD inter frequency cell within $T_{identify_inter_UE\ cat\ M1_NC}$ as shown in table 8.13.2.6.3.2-1A.

**Table 8.13.2.6.3.2-1: Requirement to identify a newly detectable TDD interfrequency cell**

| Gap pattern ID | DRX cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | ≤0.04 | 1.44* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.04<DRX-cycle≤0.08 | Note 2 (40* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128 | 3.2* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (25* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| | 0.128<DRX-cycle≤2.56 | Note 2(20* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.128 | 2.88* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128 | 3.2* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (25* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |

| | | |
|---|---|---|
| | 0.128<DRX-cycle≤2.56 | Note 2(20* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.3.2-1A: Requirement to identify a newly detectable TDD interfrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (20* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.21.9 and 9.1.21.10 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.13 and 9.1.21.14 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-1 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_NC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is in use, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.3.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_NC}$ is as defined in Table 8.13.2.6.3.2-3.

**Table 8.13.2.6.3.2-2: Requirement to measure TDD inter frequency cells**

| Gap pattern ID | DRX cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (DRX cycles) |
|---|---|---|
| 0 | <0.128 | 0.48* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.128≤DRX-cycle≤2.56 | Note 2 (5* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| 1 | <0.256 | 0.96* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$ (Note 1) |
| | 0.256≤DRX-cycle≤2.56 | Note 2 (5* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | |

**Table 8.13.2.6.3.2-3: Requirement to measure TDD inter frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_NC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5* $K_{inter_M1}$ * $K_{RSTD_M1_NC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.9 and 9.1.21.10.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.13 and 9.1.21.14.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

### 8.13.2.6.3.2.1 Measurement Reporting Requirements

#### 8.13.2.6.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

#### 8.13.2.6.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.2.6.3.2.1.3.

#### 8.13.2.6.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$.This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_UE\ cat\ M1_NC}$ defined in Clause 8.13.2.6.3.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_NC}$ defined in clause 8.13.2.6.3.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_NC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.2.7 Maximum allowed layers for multiple monitoring for UE category M1 with CE mode A

The UE UE category M1 configured with CE mode A shall be capable of monitoring at least:

- Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 2 TDD E-UTRA carriers.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 5 carrier frequency layers, which include one serving carrier frequency and any of the above defined combination of E-UTRA FDD inter-frequency and E-UTRA TDD inter-frequency layers.

### 8.13.2.8 Channel quality report for UE Category M1 in connected mode with CE mode A

The requirements in this clause shall apply for UE supporting DL channel quality reporting for UE Category M1 as defined in TS 36.321 [17] section 5.25.

The DL channel quality provides the serving eNB with information about

- the minimum MPDCCH repetition level to satisfy the hypothetical MPDCCH block error rate of 1% with the parameters specified in Table 8.13.2.8-1 if the repetition level in DL quality report is larger than 1, or
- the minimum MPDCCH aggregation level to satisfy the hypothetical MPDCCH block error rate of 1% with the parameters specified in in Table 8.13.2.8-2 if the repetition level in DL quality report is 1.

**Table 8.13.2.8-1: MPDCCH transmission parameters for downlink quality reporting, repetition number being reported**

| Attribute | CEModeA |
|---|---|
| DCI format | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| MPDCCH Aggregation level (ECCE) Note2 | 24 |
| M-PDCCH Transmission type | Distributed |

**Table 8.13.2.8-2: MPDCCH transmission parameters for downlink quality reporting, aggregation level being reported**

| Attribute | CEModeA |
|---|---|
| DCI format | 6-1A |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| MPDCCH repetition level Note1 | 1 |
| M-PDCCH Transmission type | Distributed |
| NOTE 1: Not applicable if repetition number in DL quality information is larger than 1.<br>NOTE 2: Not applicable if repetition number in DL quality information equals to 1. | |

The MPDCCH repetition level or aggregation level is chosen from the supported MPDCCH repetition levels and aggregation levels [3]. The report mapping is defined in section 9.1.21.22.

The UE shall satisfy the downlink channel quality measurement accuracy requirements as specified in section 9.1.21.23.

## 8.13.3 Requirements for UE category M1 with CE mode B

The UE category M1 applicability of the requirements in subclause 8.13.3 is defined in Section 3.6. The requirements defined in clause 8.13.3 apply provided the following conditions are met:

- UE is configured with measurement gap pattern ID#0 or ID#1 defined in Table 8.1.2.1-1.

Alternatively, the UE shall meet the requirements in subclause 8.13.3 defined for gap pattern ID#0 without using any measurement gaps provided:

- UE indicates it does not need gaps with the capability intraFreq-CE-NeedForGaps-r13 [2, TS36.331] for the frequency band of the serving cell, or

- UE is not configured with any reporting configuration that requires measurement on any intra-frequency neighbour cell.

### 8.13.3.1 E-UTRAN intra frequency measurements by UE category M1 with CE mode B

The UE shall be able to identify new intra-frequency cells and perform RSRP and RSRQ measurements of identified intra-frequency cells without an explicit intra-frequency neighbour cell list containing physical layer cell identities. During the RRC_CONNECTED state the UE shall continuously measure identified intra frequency cells and additionally search for and identify new intra frequency cells.

The UE is allowed to perform RSRP measurements based on RSS signals provided UE is configured with *rss-ConfigCarrierInfo* [2] and following conditions are met:

- If measurement gaps are configured, the measured subframes containing RSS are available before or after the measurement gaps and UE shall measure RSS outside the gaps, and

- RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH if UE supports measuring neighbour cell RSS in the same MPDCCH bandwidth, or within the same RSS RB location of the serving cell if UE does not support measuring neighbour cell RSS in the same MPDCCH bandwidth, for 5 successive DRX cycles or MPDCCH monitoring cycles and the last subframe of the RSS occasion of the measured cell is in the window of [n-5, n-1] where n is the first subframe of DRX ON duration or MPDCCH monitoring occasion, and

- RSS-based measurement period ($T_{measure_intra_UE\ cat\ M1}$) is not longer than CRS-based measurement period , and

- RSS power offset ($P_{RSS}$) with respect to CRS as defined in *RSS-Config* or *rss-MeasPowerBias* [2], where $P_{RSS} \geq$ 0 dB.

- RSRQ is not configured as trigger quantity or report quantity for intra-frequency measurement

If UE performs RSRP measurement based on RSS for serving or neighbour cell, it is not expected to perform RSRP measurement based on CRS on that cell. UE shall compensate the RSS power offset ($P_{RSS}$) with respect to CRS when derving the RSRP measurement based on RSS.

For performing RSRP measurement based on RSS on detected intra-frequency cells, UE assumes BL/CE DL subframe configuration of each neighbor cell is same as serving cell. The requirements for RSRP measurement based on RSS for a neighbour cell apply provided that BL/CE DL subframe configuration of the neighbor cell is same as serving cell.

Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the RSS transmission of each neighbor cell starts in the radio frame within a window of +/- 5ms around the calculated radio frame offset of the serving cell.

### 8.13.3.1.1 E-UTRAN FDD intra frequency measurements

#### 8.13.3.1.1.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify and measure a new detectable FDD intra frequency cell according to requirements in Table 8.13.3.1.1.1-1 provided that additional conditions table 8.13.3.1.1.1-1 is met, and

- G=1, or
- $r_{max}$*G < 800ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.3.1.1.1-4 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.3.1.1.1-1: Requirement on cell identification delay and measurement delay for FDD intrafrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | 320.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 800 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | 321.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| Q2≥-6 | 0 | 21.8* $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 800 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | 22.6* $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$ s | 1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| N/A | N/A | N/A | 5 x TRSS (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | |

**Table 8.13.3.1.1.1-2: Void**

$K_{intra_M1_EC}$ = 100 / X where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.3.1.1.1-3. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1. When inter frequency measurement is not configured, $K_{intra_M1_EC}$=1 regardless whether or how parameter measGapSharingScheme [2] is configured.

**Table 8.13.3.1.1.1-3: Value of parameter X for CEModeB**

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |

| | |
|---|---|
| '10' | 75 |
| '11' | 87.5 |

**Table 8.13.3.1.1.1-4: Requirement on cell identification delay and measurement delay for FDD intrafrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1)}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1)}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | Max(400 * $r_{max}$* G / 1000, 320.8) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | Max(400 * $r_{max}$* G / 1000, 321.6) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| Q2≥-6 | 0 | Max(20 * $r_{max}$* G / 1000, 21.8)* $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | Max(20 * $r_{max}$* G / 1000, 22.6)* $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| N/A | N/A | N/A | Max($r_{max}$*G, $T_{RSS}$) x 5 (Note 1) |
| Note 1: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | |

$$K_{RSTD_M1_EC} = \frac{1}{1\text{-}\max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$
- PRS bandwidth is less than the bandwidth of the cell used for RSTD measurement in which case gaps are required

where

- $T_{PRS}$is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_EC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-3 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_intra_UE\ cat\ M1_EC}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is according to Table 8.13.3.1.1.1-1. When measurement gaps are activated the UE shall be capable of performing measurements for at least 6 cells. If the UE has identified more than 6 cells, the UE shall perform measurements but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.7.

#### 8.13.3.1.1.1.1 Measurement Reporting Requirements

##### 8.13.3.1.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

##### 8.13.3.1.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.3,9.1.21.4 and 9.1.21.7.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.1.1.1.1.3.

##### 8.13.3.1.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.1.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_EC}$ defined in clause 8.13.3.1.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_UE\ cat\ M1_EC,\ Intra}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.3.1.1.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.1.2-1 provided that additional conditions Table 8.13.3.1.1.2-1 is met.

When eDRX_CONN is in use the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.1.2-1B.

**Table 8.13.3.1.1.2-1: Requirement to identify a newly detectable FDD intrafrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{intra_M1_EC*}$ $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2 (400 * $K_{intra_M1_EC*}$ $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{intra_M1_EC*}$ $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{intra_M1_EC*}$ $K_{RSTD_M1_EC}$) |

| | | | |
|---|---|---|---|
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.1.1.2-1A: Void**

**Table 8.13.3.1.1.2-1B: Requirement to identify a newly detectable FDD intrafrequency cell when eDRX_CONN is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-3 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1_EC}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as specified in table 8.13.3.1.1.2-2 provided that additional conditions table 8.13.3.1.1.2-2 is met. When eDRX_CONN is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as specified in table 8.13.3.1.1.2-4. The UE shall be capable of performing RSRP and RSRQ measurements for 6 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1_EC}$.

**Table 8.13.3.1.1.2-2: Requirement to measure FDD intrafrequency cells**

| Target cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| Q2≥-15 | 0 | ≤0.16 | 0.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.16<DRX-cycle≤2.56 | Note2(5 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| | 1 | ≤0.32 | 1.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| N/A | N/A | N/A | Max(DRX cycle length, $T_{RSS}$ ) x 5 (Note 3) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.1.1.2-3: Void**

**Table 8.13.3.1.1.2-4: Requirement to measure FDD intrafrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.3 and 9.1.21.4.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.7.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

#### 8.13.3.1.1.2.1 Measurement Reporting Requirements

##### 8.13.3.1.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

##### 8.13.3.1.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.1.1.2.1.3.

##### 8.13.3.1.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra,\ UE\ cat\ M1_EC}$ defined in Clause 8.13.3.1.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_EC}$ defined in clause 8.13.3.1.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.1.2 E-UTRAN intra frequency measurements for HD-FDD

#### 8.13.3.1.2.1 E-UTRAN intra frequency measurements when no DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.3.1.1.1 also apply for this section provided the following conditions are met:

- at least downlink subframe # 0 and downlink subframe # 5 per radio frame of an intra-frequency cell to be identified by the UE is available at the UE over $T_{identify_intra_UE\ cat\ M1_EC}$;
- at least two consecutive downlink subframe per radio frame of measured cell is available at the UE for RSRP measurements assuming measured cell is identified cell over $T_{measure_intra_UE\ cat\ M1_EC}$.
- RSRP related side conditions given in Sections 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,

- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-4

#### 8.13.3.1.2.2 E-UTRAN intra frequency measurements when DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

When DRX is in use the UE shall be able to identify a new detectable HD-FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.2.2-1 provided that additional conditions table 8.13.3.1.2.2-1 is met.

When eDRX_CONN is in use, the UE shall be able to identify a new detectable FDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.2.2-1B.

**Table 8.13.3.1.2.2-1: Requirement to identify a newly detectable HD-FDD intrafrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2 (400 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$) |
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2 (24 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{intra_M1}$ * $K_{RSTD_M1_EC}$) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.1.2.2-1A: Void**

**Table 8.13.3.1.2.2-1B: Requirement to identify a newly detectable HD-FDD intrafrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-4 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1_EC}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as specified in table 8.13.3.1.2.2-2 provided that additional conditions Table 8.13.3.1.2.2-2 is met. When eDRX_CONN cycle is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as specified in table 8.13.3.1.2.2-4. The UE shall be capable of performing RSRP and RSRQ measurements for 6 identified-intra-frequency cells, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1_EC}$.

**Table 8.13.3.1.2.2-2: Requirement to measure HD-FDD intrafrequency cells**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| Q2≥-15 | 0 | <0.128 | 0.8 * $K_{intra_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.128≤DRX-cycle≤0.16 | Note2 (7 * $K_{intra_EC}$ * $K_{RSTD_M1_EC}$) |
| | | 0.16<DRX-cycle≤2.56 | Note2(5 * $K_{intra_EC}$ * $K_{RSTD_M1_EC}$) |
| | 1 | ≤0.32 | 1.6 * $K_{intra_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{intra_EC}$ * $K_{RSTD_M1_EC}$) |
| N/A | N/A | N/A | Max (DRX cycle length, $T_{RSS}$ ) x 5 (Note 3) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use<br>Note 3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | |

**Table 8.13.3.1.2.2-3: Void**

**Table 8.13.3.1.2.2-4: Requirement to measure HD-FDD intrafrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | NOTE (5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.3 and 9.1.21.4.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.7.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

8.13.3.1.2.2.1 Measurement Reporting Requirements

8.13.3.1.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

8.13.3.1.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.1.2.2.1.3.

8.13.3.1.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.1.2.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_EC}$ defined in clause 8.13.3.1.2.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.1.3 E-UTRAN TDD intra frequency measurements

#### 8.13.3.1.3.1 E-UTRAN intra frequency measurements when no DRX is used

When no DRX is in use the UE shall be able to identify and measure a new detectable TDD intra frequency cell according to requirements in Table 8.13.3.1.3.1-1provided that additional conditions Table 8.13.3.1.3.1-2 is met, and

- G=1, or
- $r_{max}$*G < 800ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.3.1.3.1-4 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.3.1.3.1-1: Requirement on cell identification delay and measurement delay for TDD intrafrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) for neighbouring cell SCH Ês/Iot (Q): -15≤ Q2 < -6 | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | 320.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 800 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ Note1<br>1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ Note2 |
| | 1 | 321.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>3200 * $K_{intra_M1_EC}$ ms Note2 |
| Q2≥-6 | 0 | 21.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ S | 800 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | 22.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ S | 1600 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>3200 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| N/A | N/A | N/A | 5 x $T_{RSS}$ (Note 3) |
| Note1: Under TDD UL/DL configuration other than 0.<br>Note2: Under TDD UL/DL configuration 0.<br>Note3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | |

$K_{intra_M1_EC}$ = 100 / X where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.3.1.3.1-3. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1. When inter frequency measurement is not configured, $K_{intra_M1_EC}$=1 regardless whether or how parameter measGapSharingScheme [2] is configured.

**Table 8.13.3.1.3.1-2: Void**

**Table 8.13.3.1.3.1-3: Value of parameter X for CEModeB**

| *measGapSharingScheme* | Value of X (%) |
|---|---|

| | |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 75 |
| '11' | 87.5 |

**Table 8.13.3.1.3.1-4: Requirement on cell identification delay and measurement delay for TDD intrafrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | Max(400 * $r_{max}$* G / 1000, 320.8) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | Max(400 * $r_{max}$* G / 1000, 321.6) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 3200) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| Q2≥-6 | 0 | Max(20 * $r_{max}$* G / 1000, 21.8)* $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | Max(20 * $r_{max}$* G / 1000, 22.6)* $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 3200) * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| N/A | N/A | N/A | Max($r_{max}$*G, $T_{RSS}$) x 5 (Note 3) |
| Note1: Under TDD UL/DL configuration other than 0.<br>Note2: Under TDD UL/DL configuration 0.<br>Note3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | |

$$K_{RSTD_M1_EC} = \frac{1}{1-\max\left(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}}\right)}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$
- PRS bandwidth is less than the bandwidth of the cell used for RSTD measurement in which case gaps are required

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_EC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,

- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-3 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $\mathbf{T_{measure_intra_UE\ cat\ M1_EC}}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for intra frequency measurements is according to Table 8.13.3.1.3.1-1. When measurement gaps are activated the UE shall be capable of performing measurements for at least 6 cells. If the UE has identified more than 6 cells, the UE shall perform measurements but the reporting rate of RSRP and RSRQ measurements of cells from UE physical layer to higher layers may be decreased.

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.3 and 9.1.21.4.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.7.

#### 8.13.3.1.3.1.1 Measurement Reporting Requirements

##### 8.13.3.1.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

##### 8.13.3.1.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.1.3.1.1.3.

##### 8.13.3.1.3.1.1.3 Event Triggered Reporting

Reported RSRP measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1,* othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ intra_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.1.3.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_EC}$ defined in clause 8.13.3.1.3.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Intra_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.3.1.3.2 E-UTRAN intra frequency measurements when DRX is used

When DRX is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_\ UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.3.2-1 provided that additional conditions table 8.13.3.1.3.2-1 is met.

When eDRX_CONN is in use the UE shall be able to identify a new detectable TDD intra frequency cell within $T_{identify_intra_UE\ cat\ M1_EC}$ as shown in table 8.13.3.1.3.2-1B.

**Table 8.13.3.1.3.2-1: Requirement to identify a newly detectable TDD intrafrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2 (400 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{intra_M1_EC}$* $K_{RSTD_M1_EC}$) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.1.3.2-1A: Void**

**Table 8.13.3.1.3.2-1B: Requirement to identify a newly detectable TDD intrafrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.21.3 and 9.1.21.4 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.7 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-3 for a corresponding Band

In the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra_UE\ cat\ M1_EC}$. When DRX is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as shown in table 8.13.3.1.3.2-2 provided that additional conditions Table 8.13.3.1.3.2-2 is met. When eDRX_CONN is used, $T_{measure_intra_UE\ cat\ M1_EC}$ is as shown in table 8.13.3.1.3.2-4. The UE shall be capable of performing RSRP and RSRQ measurement for 6 identified intra-frequency cells and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{measure_intra_UE\ cat\ M1_EC}$.

**Table 8.13.3.1.3.2-2: Requirement to measure TDD intra frequency cells**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | TDD Uplink-downlink configuration | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|---|
| Q2≥-15 | Other than 0 | 0 | ≤0.16 | 0.8 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.16<DRX-cycle≤2.56 | Note2 (5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| | | 1 | ≤0.32 | 1.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| | 0 | 0 | ≤0.32 | 1.6 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.32<DRX-cycle≤2.56 | Note2 (5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |

| | | | | |
|---|---|---|---|---|
| | | 1 | ≤0.64 | 3.2 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.64<DRX-cycle≤2.56 | Note2 (5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| N/A | N/A | N/A | N/A | Max(DRX cycle length, $T_{RSS}$) x 5 (Note 3) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note 2: Time depends upon the DRX cycle in use.<br>Note 3: It is the measurement period for RSRP measured on RSS signals defined in *RSS-Config* [2]. | | | | |

**Table 8.13.3.1.3.2-3: Void**

**Table 8.13.3.1.3.2-4: Requirement to measure TDD intra frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_intra_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{intra_M1_EC}$ * $K_{RSTD_M1_EC}$) |
| NOTE: Time depends upon the eDRX_CONN cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.3 and 9.1.21.4.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.7.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

8.13.3.1.3.2.1 Measurement Reporting Requirements

8.13.3.1.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

8.13.3.1.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.1.3.2.1.3.

8.13.3.1.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.3, 9.1.21.4 and 9.1.21.7.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_intra_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.1.3.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_intra_UE\ cat\ M1_EC}$ defined in clause 8.13.3.1.3.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_intra_UE\ cat\ M1_EC}$ provided the timing to that cell has

not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.3.1.4 E-UTRAN FDD intra frequency measurements with autonomous gaps for UE category M1 with CE mode B

The requirements defined in this subclause 8.13.3.1.4 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BRare supported in the target cell to be detected.

##### 8.13.3.1.4.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1-BRmessage according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_CatM1,intra} = T_{basic_identify_CGI_CatM1,intra} \quad ms$$

Where

$T_{basic_identify_CGI_Cat\ M1,\ intra}$ is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

- For UE not supporting cross-TTI MIB/SIB-BR decoding, $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 5120 ms.
- For UE supporting cross-TTI MIB/SIB1-BR decoding, $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 3200 ms provided that the target E-UTRA cell does not change the MIB payload information except the system frame number across MIB TTI and does not change the SIB1-BR information across SIB1-BR TTI. Otherwise $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 5120 ms.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_Cat\ M1,.intra}$ is applicable when no DRX is used as well as when any of DRX and eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_CatM1,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the PBCH repetition and SIB1-BR repetition level in the target cell shall be as specified in Table 8.13.3.1.4.1-1.

**Table 8.13.3.1.4.1-1: Conditions in target cell during $T_{basic_identify_CGI_Cat\ M1,\ intra}$.**

| Target cell | | | |
|---|---|---|---|
| Ês/Iot [dB] | PBCH repetition | SIB1-BR repetition level | SIB1-BR TBS |
| ≥ -15 | Configured as specified in TS 36.211 [16] | 16 | 208 |

##### 8.13.3.1.4.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

#### 8.13.3.1.5 E-UTRAN intra frequency measurements with autonomous gaps for HD-FDD UE category M1 with CE mode B

The requirements in this section are applicable for the UE which supports half duplex FDD operation on one or more supported frequency bands [2].

The requirements defined in this subclause 8.13.3.1.5 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BR are supported in the target cell to be detected.

##### 8.13.3.1.5.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

The CGI requirements defined in clause 8.13.3.1.4.1 also apply for this section.

##### 8.13.3.1.5.2 ECGI Reporting Delay

The ECGI reporting delay defined in clause 8.13.3.1.5.2 also apply for this section

#### 8.13.3.1.6 E-UTRAN TDD intra frequency measurements with autonomous gaps for UE category M1 with CE mode B

The requirements defined in this subclause 8.13.3.1.6 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BR are supported in the target cell to be detected.

##### 8.13.3.1.6.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose ‘reportCGI’. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1-BR messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of ‘reportCGI’, regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_CatM1,intra} = T_{basic_identify_CGI_CatM1,intra} \quad ms$$

Where

$T_{basic_identify_CGI_Cat\ M1,\ intra}$ is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

- For UE not supporting cross-TTI MIB/SIB-BR decoding, $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 5120 ms.
- For UE supporting cross-TTI MIB/SIB1-BR decoding, $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 3200 ms, provided that the target E-UTRA cell does not change the MIB payload information except the system frame number across MIB TTI and does not change the SIB1-BR information across SIB1-BR TTI. Otherwise $T_{basic_identify_CGI_Cat\ M1,\ intra}$ = 5120 ms.

A cell shall be considered identifiable when the following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_Cat\ M1,\ intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_CatM1,intra}$ $ms$, over which the UE identifies the new CGI of E-UTRA cell, the PBCH repetition and SIB1-BR repetition level in the target cell shall be as specified Table 8.13.3.1.6.1-2.

**Table 8.13.3.1.6.1-1: Conditions in target cell during $T_{basic_identify_CGI_Cat\ M1,\ intra}$.**

| Target cell | | | |
|---|---|---|---|
| Ês/Iot [dB] | PBCH repetition level | SIB1-BR repetition level | SIB1-BR TBS |
| ≥ -15 | Configured with repetition, as specified in TS 36.211 [16] | 16 | 208 |

### 8.13.3.1.6.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

## 8.13.3.2 Void

## 8.13.3.3 E-UTRAN OTDOA Intra-Frequency RSTD Measurements for Cat-M1 UE in CEModeB

All intra-frequency RSTD measurement requirements specified in Sections 8.13.3.3 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All the measurement requirements specified in Sections 8.13.3.3 shall apply provided that the UE is configured:

- with the single PRS configuration for the reference cell and all the neighbour cells and
- with either the measurement gap pattern ID #0 specified in Clause 8.1.2.1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 for cat M1 RSTD measurements if the PRS bandwidth is less than the bandwidth of the cell used for the RSTD measurement in which case gaps are required.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

### 8.13.3.3.1 E-UTRAN FDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqFDD,Cat_M}$ ms as given below (see also Figure 8.13.3.3.1-1):

$$T_{RSTDIntraFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDIntraFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.13.3.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\angle = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{\text{PRS}}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{\text{actual_PR}}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{\text{actual_PR}} = N_{\text{PRS}}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{\text{actual_PR}}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{\text{actual_PR}}$ = (MGL-2) if MGRP$\geq N_{\text{PRS}} >$(MGL-2), $N_{\text{actual_PR}} = (MGL-2) \cdot \left\lfloor N_{\text{PRS}} / MGRP \right\rfloor$ if $N_{\text{PRS}} >$MGRP, and $N_{\text{actual_PR}} = N_{\text{PRS}}$ if $N_{\text{PRS}} \leq$(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.21.

$T_{\text{PRS}}$ $N_{\text{PRS}}$, $N_{\text{actual_PR}}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{\text{MIB}}$ is the time required for acquiring the MIB information of the target cell. $T_{\text{MIB}}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.3.3.1-1: Number of PRS positioning occasions within $T_{\text{RSTDIntraFreqFDD,Cat_M}}$**

| Positioning subframe configuration period $T_{\text{PRS}}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1.<br>Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{\text{RSTDIntraFreqFDD,Cat_M}}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{\text{dBm}}$ according to Annex B.2.22 for a corresponding Band

$\text{PRS } \hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqFDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.13.3.3.1-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.21.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDIntraFreqFDD,Cat_M,HO}$ ) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,Cat_M,HO} = T_{RSTDIntraFreqFDD,Cat_M} + K \times T_{PRS} + T_{HO} \quad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,Cat_M,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

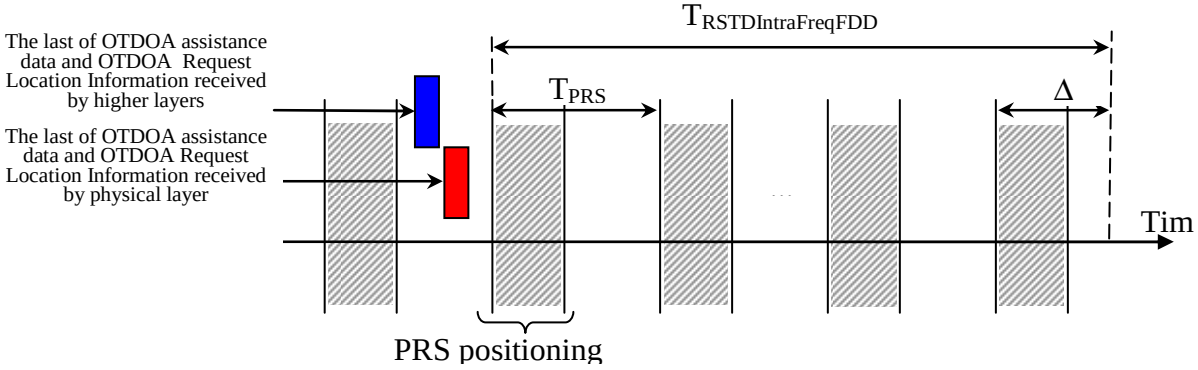


**Figure 8.13.3.3.1-1: Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

### 8.13.3.3.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.21.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqFDD,Cat_M}$ defined in Clause 8.13.3.3.1.

#### 8.13.3.3.2 E-UTRAN TDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDIntraFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB},$$

where

$T_{RSTDIntraFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.13.3.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PR}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{actual_PR}$= $N_{PRS}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{actual_PR}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{actual_PR}$ = (MGL-2) if MGRP≥ $N_{PRS}$ >(MGL-2), $N_{actual_PR}$ = $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$ if $N_{PRS}$ >MGRP, and $N_{actual_PR}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.21.

$T_{PRS}$ $N_{PRS}$, $N_{actual_PR}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.3.3.1-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqTDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |

| | | |
|---|---|---|
| >160 ms | $8 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqTDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(PRS\ \hat{E}_s / Iot\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\ \hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.22 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.21.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqTDD,Cat_M,HO} = T_{RSTDIntraFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.13.3.3.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.13.3.3.2-2.

**Table 8.13.3.3.2-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|

| | |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.13.3.3.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.21.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqTDD,Cat_M}$ defined in Clause 8.13.3.3.2.

### 8.13.3.3.3 E-UTRAN HD-FDD Intra-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.3.3.1 also apply for this section except the reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.21.21 are available for RSTD measurements in the measured and reference cells.

#### 8.13.3.3.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.21.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period defined in Clause 8.13.3.3.3.

## 8.13.3.4 E-UTRAN E-CID Measurements Requirements for UE category M1 with CE mode B

### 8.13.3.4.1 Intra-frequency E-CID FDD RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

#### 8.13.3.4.1.1 Introduction

The requirements in section 8.13.3.4.1 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN FDD intra-frequency RSRP and RSRQ measurements [24].

#### 8.13.3.4.1.2 Measurement Requirements

The requirements in section 8.13.3.1.1 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.1.3.

#### 8.13.3.4.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.3, 9.1.21.4 and 9.1.21.7.

### 8.13.3.4.2 Intra-frequency HD-FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

#### 8.13.3.4.2.1 Introduction

The requirements in section 8.13.3.4.2 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN HD-FDD intra-frequency RSRP and RSRQ measurements [24].

#### 8.13.3.4.2.2 Measurement Requirements

The requirements in section 8.13.3.4.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.2.3.

#### 8.13.3.4.2.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.3, 9.1.21.4 and 9.1.21.7.

### 8.13.3.4.3 Intra-frequency TDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

#### 8.13.3.4.3.1 Introduction

The requirements in section 8.13.3.4.3 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN TDD intra-frequency RSRP and RSRQ measurements [24].

#### 8.13.3.4.3.2 Measurement Requirements

The requirements in section 8.13.3.4.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.3.3.

#### 8.13.3.4.3.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B

provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.3, 9.1.21.4 and 9.1.21.7.

### 8.13.3.4.4 Inter-frequency E-CID FDD RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

#### 8.13.3.4.4.1 Introduction

The requirements in section 8.13.3.4.4 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN FDD inter-frequency RSRP and RSRQ measurements [24].

#### 8.13.3.4.4.2 Measurement Requirements

The requirements in section 8.13.3.5.1 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.4.3.

#### 8.13.3.4.4.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

### 8.13.3.4.5 Inter-frequency HD-FDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

#### 8.13.3.4.5.1 Introduction

The requirements in section 8.13.3.4.5 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN HD-FDD inter-frequency RSRP and RSRQ measurements [24].

#### 8.13.3.4.5.2 Measurement Requirements

The requirements in section 8.13.3.5.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.5.3.

#### 8.13.3.4.5.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

#### 8.13.3.4.6 Inter-frequency TDD E-CID RSRP and RSRQ Measurements for Cat-M1 UE in CEModeB

##### 8.13.3.4.6.1 Introduction

The requirements in section 8.13.3.4.6 shall apply provided the UE has received ECID-RequestLocationInformation message from E-SMLC via LPP requesting the UE to report E-CID E-UTRAN TDD inter-frequency RSRP and RSRQ measurements [24].

##### 8.13.3.4.6.2 Measurement Requirements

The requirements in section 8.13.3.5.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in section 8.13.3.4.6.3.

##### 8.13.3.4.6.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

### 8.13.3.5 E-UTRAN inter frequency measurements by UE category M1 with CE Mode B

The UE shall be able to identify new inter-frequency cells and perform RSRP and RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided. During the RRC_CONNECTED state the UE shall continuously measure identified inter frequency cells and additionally search for and identify new inter frequency cells.

#### 8.13.3.5.1 E-UTRAN FDD - FDD inter frequency measurements

##### 8.13.3.5.1.1 E-UTRAN FDD - FDD inter frequency measurements when no DRX is used

When no DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify and measure a new detectable FDD inter-frequency cell according to requirements in Table 8.13.3.5.1.1-1 when additional condition in Table 8.13.3.5.1.1-1 is met, and

- G=1, or
- $r_{max}$*G < 800ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.3.5.1.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.3.5.1.1-1: Requirement on cell identification delay and measurement delay for FDD interfrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | 320.8 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 800 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | 321.6 * $K_{inter_M1}$ s | 1600 * $K_{inter_M1}$ ms |
| Q2≥-6 | 0 | 21.8 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ s | 800 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms |
| | 1 | 22.6 * $K_{inter_M1_EC}$ s | 1600 * $K_{inter_M1_EC}$ ms |

$$K_{inter_M1_EC} = \frac{N_{freq} * 100}{(100 - X)}$$

where X is signalled by the RRC parameter *measGapSharingScheme* [2] and is defined as in Table 8.13.3.5.1.1-2.
$N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1.

**Table 8.13.3.5.1.1-2: Value of parameter X for CEModeB**

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 75 |
| '11' | 87.5 |

**Table 8.13.3.5.1.1-3: Requirement on cell identification delay and measurement delay for FDD interfrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | Max(400 * $r_{max}$* G / 1000, 320.8) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms |
| | 1 | Max(400 * $r_{max}$* G / 1000, 321.6) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms |
| Q2≥-6 | 0 | Max(20 * $r_{max}$* G / 1000, 21.8)* $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 800) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms |
| | 1 | Max(20 * $r_{max}$* G / 1000, 22.6)* $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms |

$$K_{RSTD_M1_EC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS}$ > 40 ms
- $T_{PRS}$ > $N_{PRS}$

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_EC}$ = 1.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.18-1 for a corresponding Band.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{measure_inter_UE\ cat\ M1_EC}$. If higher layer filtering is used, an additional cell identification delay can be expected.

In the RRC_CONNECTED state the measurement period for inter frequency measurements is according to Table 8.13.3.5.1.1-1. When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 3 FDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period defined in Table 8.13.3.5.1.1-1.

#### 8.13.3.5.1.1.1 Measurement Reporting Requirements

##### 8.13.3.5.1.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

##### 8.13.3.5.1.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.5.1.1.1.3.

##### 8.13.3.5.1.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ inter_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.5.1.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_EC}$ defined in clause 8.13.3.5.1.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_UE\ cat\ M1_EC,\ Inter}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.5.1.2 E-UTRAN inter frequency measurements when DRX is used

When DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_EC}$ as shown in table 8.13.3.5.1.2-1.

When eDRX_CONN is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_EC}$ as shown in table 8.13.3.5.1.2-1.

**Table 8.13.3.5.1.2-1: Requirement to identify a newly detectable FDD interfrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note1: Number of DRX cycle depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.5.1.2-1B: Requirement to identify a newly detectable FDD interfrequency cell when eDRX_CONN is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.18-1 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_EC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.1.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.1.2-2.

**Table 8.13.3.5.1.2-2: Requirement to measure FDD interfrequency cells**

| Target cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| Q2≥-15 | 0 | ≤0.16 | 0.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.16<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | ≤0.32 | 1.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.5.1.2-3: Requirement to measure FDD interfrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5* $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.11 and 9.1.21.12.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.15 and 9.1.21.16.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

#### 8.13.3.5.1.2.1 Measurement Reporting Requirements

##### 8.13.3.5.1.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

##### 8.13.3.5.1.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.5.1.2.1.3.

##### 8.13.3.5.1.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter,\ UE\ cat\ M1_EC}$ defined in Clause 8.13.3.5.1.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_EC}$ defined in clause 8.13.3.5.1.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.5.2 E-UTRAN inter-frequency measurements for HD-FDD

#### 8.13.3.5.2.1 E-UTRAN inter-frequency measurements when no DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.3.5.1.1 also apply for this section provided the following conditions are met:

- RSRP related side conditions given in Sections 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.18-2 for a corresponding Band

#### 8.13.3.5.2.2 E-UTRAN inter frequency measurements when DRX is used

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

When DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_EC}$ as shown in table 8.13.3.5.2.2-1.

When eDRX_CONN is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD inter-frequency cell within $T_{identify_inter_UE\ cat\ M1_EC}$ as shown in table 8.13.3.5.2.2-1.

**Table 8.13.3.5.2.2-1: Requirement to identify a newly detectable HD-FDD interfrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.5.2.2-1B: Requirement to identify a newly detectable HD-FDD interfrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.18-2 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_EC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.2.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.2.2-2.

**Table 8.13.3.5.2.2-2: Requirement to measure HD-FDD interfrequency cells**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| Q2≥-15 | 0 | <0.128 | 0.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.128≤DRX-cycle≤0.16 | Note2 (7 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | | 0.16<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | ≤0.32 | 1.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.5.2.2-3: Requirement to measure HD-FDD interfrequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5 * K_{inter_M1} * K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.11 and 9.1.21.12.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.15 and 9.1.21.16.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

#### 8.13.3.5.2.2.1 Measurement Reporting Requirements

##### 8.13.3.5.2.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

##### 8.13.3.5.2.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.5.2.2.1.3.

##### 8.13.3.5.2.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.5.2.2 When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_EC}$ defined in clause 8.13.3.5.2.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.5.3 E-UTRAN TDD inter frequency measurements

#### 8.13.3.5.3.1 E-UTRAN inter frequency measurements when no DRX is used

When no DRX is in use and when measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify and measure a new detectable TDD inter frequency cell according to requirements in Table 8.13.3.5.3.1-1 when additional condition in Table 8.13.3.5.3.1-1 is met, and

- G=1, or
- $r_{max}$*G < 800ms, or
- UE is receiving PDSCH.

Otherwise, requirements in Table 8.13.3.5.3.1-3 apply, where $r_{max}$ and G are given by higher layer parameter *mPDCCH-NumRepetition* and *mPDCCH-startSF-UESS* respectively as defined in TS 36.213 [3].

**Table 8.13.3.5.3.1-1: Requirement on cell identification delay and measurement delay for TDD interfrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_intra_UE\ cat\ M1}$) for neighbouring cell SCH Ês/Iot (Q): -15≤ Q2 < -6 [dB] | Measurement delay ($T_{measure_intra_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | 320.8 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ S | 800 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>1600 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | 321.6 * $K_{inter_M1_EC}$ S | 1600 * $K_{inter_M1_EC}$ ms Note1<br>3200 * $K_{inter_M1_EC}$ ms Note2 |
| Q2≥-6 | 0 | 21.8 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ S | 800 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note1<br>1600 * $K_{inter_M1_EC}$ * $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | 22.6 * $K_{inter_M1_EC}$ S | 1600 * $K_{inter_M1_EC}$ ms Note1<br>3200 * $K_{inter_M1_EC}$ ms Note2 |
| Note 1: Under TDD UL/DL configuration other than 0.<br>Note 2: Under TDD UL/DL configuration 0. | | | |

$$K_{inter_M1_EC} = \frac{N_{freq} * 100}{(100 - X)}$$

where X is signalled by the RRC parameter *measGapSharingScheme* and is defined as in Table 8.13.3.5.3.1-2. $N_{freq}$ is total number of inter-frequency layers to be monitored as defined in 8.1.2.1.1.

**Table 8.13.3.5.3.1-2: Value of parameter X for CEModeB**

| *measGapSharingScheme* | Value of X (%) |
|---|---|
| '00' | $\frac{100}{N_{freq}+1}$ |
| '01' | 50 |
| '10' | 75 |
| '11' | 87.5 |

**Table 8.13.3.5.3.1-3: Requirement on cell identification delay and measurement delay for TDD interfrequency cell**

| Neighouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | Cell identification delay ($T_{identify_inter_UE\ cat\ M1}$) | Measurement delay ($T_{measure_inter_UE\ cat\ M1}$) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | Max(400 * $r_{max}$* G / 1000, 320.8) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ S | Max(5 * $r_{max}$* G, 800) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note2 |
| | 1 | Max(400 * $r_{max}$* G / 1000, 321.6) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ S | Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 3200) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note2 |
| Q2≥-6 | 0 | Max(20 * $r_{max}$* G / 1000, 21.8)* $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ S | Max(5 * $r_{max}$* G, 800) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note2 |

| | | | |
|---|---|---|---|
| | 1 | Max(20 * $r_{max}$* G / 1000, 22.6)* $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ s | Max(5 * $r_{max}$* G, 1600) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note1<br>Max(5 * $r_{max}$* G, 3200) * $K_{inter_M1_EC}$* $K_{RSTD_M1_EC}$ ms Note2 |
| Note1: Under TDD UL/DL configuration other than 0.<br>Note2: Under TDD UL/DL configuration 0. | | | |

$$K_{RSTD_M1_EC} = \frac{1}{1 - \max(\frac{40}{T_{PRS}}, \frac{N_{PRS}}{T_{PRS}})}$$

$K_{RSTD_M1_NC}$ is applicable provided following conditions are met:

- $T_{PRS} > 40$ ms
- $T_{PRS} > N_{PRS}$

where

- $T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.211 [16],
- $N_{PRS}$ is the number of consecutive downlink positioning subframes in a positioning occation defined in TS 36.211

Otherwise $K_{RSTD_M1_EC} = 1$.

A cell shall be considered detectable when

- RSRP related side conditions given in Sections 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.16-1 for a corresponding Band.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP and RSRQ to higher layers with measurement accuracy as specified in sub-clauses 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16 with measurement period ($T_{measure_inter_UE\ cat\ M1_EC}$) given by table 8.13.3.5.3.1-1:

The UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_EC}$.

#### 8.13.3.5.3.1.1 Measurement Reporting Requirements

##### 8.13.3.5.3.1.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

##### 8.13.3.5.3.1.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.5.3.1.1.3.

#### 8.13.3.5.3.1.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify\ inter_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.5.3.1. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_EC}$ defined in clause 8.13.3.5.3.1 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period\ Inter_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than $\pm$ 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.5.3.2 E-UTRAN inter frequency measurements when DRX is used

When DRX is in use and when DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable TDD inter frequency cell within $T_{identify_inter_UE\ catM1}$ as shown in table 8.13.3.5.3.2-1.

When eDRX_CONN is in use the UE shall be able to identify a new detectable TDD inter frequency cell within $T_{identify_inter_UE\ cat\ M1_EC}$ as shown in table 8.13.3.5.3.2-1.

**Table 8.13.3.5.3.2-1: Requirement to identify a newly detectable TDD interfrequency cell**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | Gap pattern ID | DRX cycle length (s) | $T_{identify_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|
| -15≤ Q2 < -6 | 0 | ≤0.64 | 320.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 321.6 * $K_{inter_M1}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(400 * $K_{inter_M1}$) |
| Q2≥-6 | 0 | ≤0.64 | 21.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | 1 | DRX-cycle ≤ 0.640 | 22.6 * $K_{inter_M1}$ (Note1) |
| | | 0.64< DRX-cycle≤2.56 | Note2(24 * $K_{inter_M1}$) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | | | |

**Table 8.13.3.5.3.2-1A: Requirement to identify a newly detectable TDD interfrequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (400 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

A cell shall be considered detectable when

- RSRP related side conditions given in Clause 9.1.21.11 and 9.1.21.12 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Clause 9.1.21.15 and 9.1.21.16 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.16-1 for a corresponding Band

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP and RSRQ measurements of at least 4 inter-frequency cells per TDD inter-frequency for up to 3 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP and RSRQ measurements to higher layers with the measurement period $T_{measure_inter_UE\ cat\ M1_EC}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is in use, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.3.2-2, and when eDRX_CONN is in use, $T_{measure_inter_UE\ cat\ M1_EC}$ is as defined in Table 8.13.3.5.3.2-2.

**Table 8.13.3.5.3.2-2: Requirement to measure TDD inter frequency cells**

| Neighbouring cell SCH Ês/Iot: Q2 [dB] | TDD Uplink-downlink configuration | Gap pattern ID | DRX cycle length (s) | $T_{measure_intra_UE\ cat\ M1}$ (s) (DRX cycles) |
|---|---|---|---|---|
| Q2≥-15 | Other than 0 | 0 | ≤0.16 | 0.8 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.16<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | | 1 | ≤0.32 | 1.6 * $K_{inter_M1}$ (Note1) |
| | | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$) |
| | 0 | 0 | ≤0.32 | 1.6 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$ (Note1) |
| | | | 0.32<DRX-cycle≤2.56 | Note2(5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| | | 1 | ≤0.64 | 3.2 * $K_{inter_M1}$ (Note1) |
| | | | 0.64<DRX-cycle≤2.56 | Note2(5) * $K_{inter_M1}$ |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use.<br>Note 2: Time depends upon the DRX cycle in use. | | | | |

**Table 8.13.3.5.3.2-3: Requirement to measure TDD inter frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter_UE\ cat\ M1_EC}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5 * $K_{inter_M1}$ * $K_{RSTD_M1_EC}$) |
| Note: Time depends upon the eDRX_CONN cycle in use. | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.11 and 9.1.21.12.

The RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.21.15 and 9.1.21.16.

The requriements in this subcluse apply regardless of MPDCCH monitoring configuration.

### 8.13.3.5.3.2.1 Measurement Reporting Requirements

#### 8.13.3.5.3.2.1.1 Periodic Reporting

Reported RSRP and RSRQ measurement contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

#### 8.13.3.5.3.2.1.2 Event-triggered Periodic Reporting

Reported RSRP and RSRQ measurement contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.13.3.5.3.2.1.3.

#### 8.13.3.5.3.2.1.3 Event Triggered Reporting

Reported RSRP and RSRQ measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.11, 9.1.21.12, 9.1.21.15 and 9.1.21.16.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode B provided that *pusch-maxNumRepetitionCEmodeB >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter_UE\ cat\ M1_EC}$ defined in Clause 8.13.3.5.3.2. When L3 filtering is used or IDC autonomous denial is configured an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify_inter_UE\ cat\ M1_EC}$ defined in clause 8.13.3.5.3.2 becomes undetectable for a period $\leq 5$ seconds and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{measure_inter_UE\ cat\ M1_EC}$ provided the timing to that cell has not changed more than ± 50 Ts and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured, an additional delay can be expected.

### 8.13.3.6 Maximum allowed layers for multiple monitoring for UE category M1 with CE mode B

The UE UE category M1 configured with CE mode B shall be capable of monitoring at least:

- Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and
- Depending on UE capability, 2 TDD E-UTRA carriers.

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 5 carrier frequency layers, which include one serving carrier frequency and any of the above defined combination of E-UTRA FDD inter-frequency and E-UTRA TDD inter-frequency layers.

### 8.13.3.7 E-UTRAN OTDOA Inter-Frequency RSTD Measurements for Cat-M1 UE in CEModeB

All inter-frequency RSTD measurement requirements specified in Sections 8.13.3.7 shall apply, provided that

- the UE is capable of inter-frequency RSTD measurements for OTDOA [24], and
- either the measurement gap pattern ID # 0 specified in Table 8.1.2.1-1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 is used or the UE supports capability of conducting inter-frequency measurements without gaps.

All inter-frequency RSTD measurement requirements specified in Sections 8.13.3.7 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.21.18 are available for RSTD measurements in the measured and reference cell.

All the measurement requirements specified in Sections 8.13.3.7 shall apply provided that the UE is configured with the single PRS configuration for the reference cell and all the neighbour cells.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.13.3.7.1 E-UTRAN FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqFDD,Cat_M}$ ms as given below (see also Figure 8.13.2.3.1-1):

$$T_{RSTDInterFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24]; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.13.3.7.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PR}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PR}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PR}$= $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$; $N_{actual_PR}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.18.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PR}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.3.7.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |

| | |
|---|---|
| Note 1: | When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. |
| Note 2: | When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.20 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDInterFreqFDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.18.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDInterFreqFDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqFDD,Cat_M,HO} = T_{RSTDInterFreqFDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqFDD,Cat_M,HO}$.

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.13.3.7.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.18.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message

as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDInterFreqTDD,Cat_M}$ defined in Clause 8.13.3.7.1.

### 8.13.3.7.2 E-UTRAN TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24]; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.13.3.7.2-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PRS}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PRS}$= $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$; $N_{actual_PRS}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.21.18.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.13.3.7.2-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,Cat_M}$**

| | **Number of PRS positioning occasions $M$** |
|---|---|

| Positioning subframe configuration period $T_{PRS}$ | f2 Note1 | f1 and f2 Note2 |
|---|---|---|
| 160 ms | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $32 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| >160 ms | $8 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2.<br>Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.20 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDInterFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.21.18.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,Cat_M,HO} = T_{RSTDInterFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The inter-frequency requirements in this clause (8.13.3.7.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.13.3.7.2-2.

**Table 8.13.3.7.2-2: TDD uplink-downlink subframe configurations applicable for TDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.13.3.7.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.18.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDInterFreqTDD,Cat_M}$ defined in Clause 8.13.3.7.2.

### 8.13.3.7.3 E-UTRAN HD-FDD Inter-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.13.3.7.1 also apply for this section except reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.21.18 are available for RSTD measurements in the measured and reference cells.

#### 8.13.3.7.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.21.18.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period as defined in Clause 8.13.3.7.3.

## 8.13.3.8 Channel quality report for UE Category M1 in connected mode with CE mode B

The requirements in this clause shall apply for UE supporting DL channel quality reporting for UE Category M1 as defined in TS 36.321 [17] section 5.25.

The DL channel quality provides the serving eNB with information about

- the minimum MPDCCH repetition level to satisfy the hypothetical MPDCCH block error rate of 1% with the parameters specified in Table 8.13.3.8-1.

**Table 8.13.3.8-1: MPDCCH transmission parameters for downlink quality reporting, repetition number being reported**

| Attribute | CEModeB |
|---|---|
| DCI format | 6-1B |
| Starting OFDM symbols | 2; Bandwidth >= 10MHz<br>3; 3MHz <= Bandwidth < 10MHz<br>4; Bandwidth = 1.4MHz |
| MPDCCH Aggregation level (ECCE) Note2 | 24 |
| M-PDCCH Transmission type | Distributed |

The MPDCCH repetition level or aggregation level is chosen from the supported MPDCCH repetition levels and aggregation levels [3]. The report mapping is defined in section 9.1.21.22.

The UE shall satisfy the downlink channel quality measurement accuracy requirements as specified in section 9.1.21.24.

# 8.14 Measurements for UE category NB1

## 8.14.1 Introduction

This clause contains requirements on the UE category NB1 regarding measurement in RRC_CONNECTED state. The requirements are specified for NB-IoT intra frequency measurements for serving NB-IoT cell. These measurements may be used by the NB-IoT for uplink power control. The measurement quantities are defined in [4], the measurement model is defined in [22] and measurement accuracies are specified in clause 9. During the RRC_CONNECTED state the UE shall continuously measure serving NB-IoT cell.

The UE shall meet all applicable requirements specified in clause 8.14 under the following conditions:

- at least 1 DL subframe per radio frame of serving NB-IoT cell is available at the UE during measurement period.

## 8.14.2 NB-IoT intra frequency measurements under normal coverage

### 8.14.2.1 NB-IoT intra frequency measurements when no DRX is used

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 800ms, unless the UE is capable of NSSS-based RRM measurements and *nsss-NumOccDiffPrecoders* value *n1* [2] is indicated by higher layers, by which the measurement period is [1600] ms. The NRSRP measurement accuracy shall be as specified in the sub-clauses 9.1.22.1.

### 8.14.2.2 NB-IoT intra frequency measurements when DRX is used

When DRX is used in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.14.2.2-1.

**Table 8.14.2.2-1: Requirement for intrafrequency measurement**

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| 0.256<DRX-cycle≤10.24 | Note1 (5) |
| Note1: Time depends upon the DRX cycle in use | |

The NRSRP measurement accuracy shall be as specified in the sub-clauses 9.1.22.1

## 8.14.3 NB-IoT intra frequency measurements under enhanced coverage

### 8.14.3.1 NB-IoT intra frequency measurements when no DRX is used

In the RRC_CONNECTED state the measurement period for intra frequency measurements is 1600ms. The NRSRP measurement accuracy shall be as specified in the sub-clauses 9.1.22.1.

### 8.14.3.2 NB-IoT intra frequency measurements when DRX is used

When DRX is used in the RRC_CONNECTED state the measurement period for intra frequency measurements is $T_{measure_intra}$ as shown in table 8.14.3.2-1.

**Table 8.14.3.2-1: Requirement for intrafrequency measurement**

| DRX cycle length (s) | $T_{measure_intra}$ (s) (DRX cycles) |
|---|---|
| 0.256<DRX-cycle≤10.24 | Note1 (5) |
| Note1: Time depends upon the DRX cycle in use | |

The NRSRP measurement accuracy shall be as specified in the sub-clauses 9.1.22.1.

## 8.14.4 Connected mode channel quality report for UE Category NB1

The requirements in this clause shall apply for UE supporting DL channel quality reporting for UE Category NB1 as defined in TS 36.331 [2] when triggered by the MAC-CE command as specified in TS 36.321 [17].

The DL channel quality provides the serving eNB with information about the minimum NPDCCH repetition level to satisfy the hypothetical NPDCCH block error rate of 1% with the parameters specified in Table 8.14.4-1.

**Table 8.14.4-1: NPDCCH transmission parameters for downlink quality reporting**

| Parameters | Values |
|---|---|
| DCI format | Format N1 |
| Number of information bits (excluding CRC) | 23bits |
| System bandwidth | 200kHz |
| Aggregation level | 2 |
| DRX | OFF |

The reported NPDCCH repetition level shall be derived from the channel quality measured over the NPDCCH period which carries the uplink grant of channel quality report for measurement of DL channel quality of the configured carrier.

The NPDCCH repetition level for QualityReport specified in TS 36.321 [17] is chosen from the supported NPDCCH repetition levels [3]. The report mapping is defined in 9.1.22.15.

The UE shall satisfy the downlink channel quality measurement accuracy requirements as specified in 9.1.22.16.

# 8.15 Void

# 8.16 Measurements for UE Category M2

## 8.16.1 Introduction

The UE category M2 applicability of the requirements in subclause 8.16 is defined in Section 3.6.

This clause contains requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are specified for E-UTRA intra frequency measurements. These measurements may be used by the E-UTRAN, e.g. for handover decisions. The measurement quantities are defined in TS 36.214 [4], the measurement model is defined in TS 36.302 [22] and measurement accuracies are specified in clause 9. Control of measurement reporting is specified in TS 36.331 [2].

The UE shall meet the requirements in Section 8.16, provided:

- the UE does not require measurement gaps for the corresponding measurements, or
- the UE requires measurement gaps for the corresponding measurements and is configured with the measurement gap pattern Id 0 or 1 and is not configured with any measurement gap pattern from Table 8.1.2.1-3.

If the UE requires measurement gaps for the corresponding measurements and is configured with the measurement gap pattern from Table 8.1.2.1-3, the UE is not required to perform any RRM measurements that requires gaps during the RSTD measurement period and the requirement in Section 8.16 shall not apply during the RSTD measurement period.

When the UE is provided with IDC solution, the UE shall also perform RRM measurements and meet the corresponding requirements in clause 8.

## 8.16.2 Requirements for UE category M2 with CE mode A

### 8.16.2.1 E-UTRAN FDD UE Rx-Tx Time Difference Measurements for UE category M2 in CEModeA

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 480 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_FDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.16.2.1-1.

**Table 8.16.2.1-1: FDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_FDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| < 0.128 | 0.48 (Note1) |
| 0.128 ≤ DRX-cycle ≤ 2.56 | Note2 (5) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_FDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_FDD_UE_Rx_Tx3} = (K+1)*(T_{measure_FDD_UE_Rx_Tx1}) + K*T_{PCcell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_FDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX or eDRX_CONN is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.25.3.

If CRS muting is enabled in a cell for which the UE performs UE Rx-Tx time difference measurement, the UE capable of supporting CRS muting [31] shall perform the UE Rx-Tx time difference measurements and meet all the requirements in this section, provided the CRS are available within UE bandwiwidth in the serving cell during the UE Rx-Tx time difference measurement period.

#### 8.16.2.1.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the

TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.16.2.1.

### 8.16.2.2 E-UTRAN TDD UE Rx-Tx Time Difference Measurements for UE category M2 in CEModeA

When no DRX is used the physical layer measurement period of the UE Rx-Tx time difference measurement shall be 480 ms.

When DRX is used in RRC_CONNECTED state the physical layer measurement period ($T_{measure_TDD_UE_Rx_Tx1}$) of the UE Rx-Tx time difference measurement shall be as specified in table 8.16.2.2-1.

**Table 8.16.2.2-1: TDD UE Rx-Tx time difference measurement requirement when DRX is used**

| DRX cycle length (s) | $T_{measure_TDD_UE_Rx_Tx1}$ (s) (DRX cycles) |
|---|---|
| < 0.128 | 0.48 (Note1) |
| 0.128 ≤ DRX-cycle ≤ 2.56 | Note2 (5) |
| Note 1: Number of DRX cycle depends upon the DRX cycle in use<br>Note 2: Time depends upon the DRX cycle in use | |

If the UE is performing UE Rx-Tx time difference measurement while the PCell is changed due to the handover then the UE shall restart the Rx-Tx measurement on the new cell. In this case the UE shall also meet the UE Rx-Tx time difference measurement and accuracy requirements. However the physical layer measurement period of the UE Rx-Tx measurement shall not exceed $T_{measure_TDD_UE_Rx_Tx3}$ as defined in the following expression:

$$T_{measure_TDD_UE_Rx_Tx3} = (K+1)*(T_{measure_TDD_UE_Rx_Tx1}) + K*T_{PCell_change_handover}$$

Where:

K is the number of times the PCell is changed over the measurement period ($T_{measure_TDD_UE_Rx_Tx3}$),

$T_{PCell_change_handover}$ is the time necessary to change the PCell due to handover.

The measurement accuracy for the UE Rx-Tx time difference measurement when DRX or eDRX_CONN is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.25.3.

If CRS muting is enabled in a cell for which the UE performs UE Rx-Tx time difference measurement, the UE capable of supporting CRS muting [31] shall perform the UE Rx-Tx time difference measurements and meet all the requirements in this section, provided the CRS are available within UE bandwidth in the serving cell during the UE Rx-Tx time difference measurement period.

#### 8.16.2.2.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.16.2.2.

### 8.16.2.2a E-UTRAN HD-FDD UE Rx-Tx Time Difference Measurements for UE category M2 in CEModeA

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands.

The requirements defined in clause 8.16.2.1 also apply for this section except the measurement reporting requirements provided the following conditions are met:

- At least one downlink and one uplink subframes per radio frame are available for the UE Rx-Tx time difference measurement in the measured cell.
- at least downlink subframe # 0 or downlink subframe # 5 per radio frame of an intra-frequency cell to be identified by the UE is available at the UE;
- SCH_RP and SCH Ês/Iot according to Annex Table B.2.14-2 for a corresponding Band

If CRS muting is enabled in a cell for which the UE performs UE Rx-Tx time difference measurement, the UE capable of supporting CRS muting [31] shall perform the UE Rx-Tx time difference measurements and meet all the requirements in this section, provided the CRS are available within UE bandwidth in the serving cell during the UE Rx-Tx time difference measurement period.

#### 8.16.2.2a.1 UE Rx-Tx Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive ECID-RequestLocationInformation message and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: *pusch-maxNumRepetitionCEmodeA* x $TTI_{DCCH}$, where *pusch-maxNumRepetitionCEmodeA* [2] is the maximum number of PUSCH repetitions configured for the UE in CE Mode A provided that *pusch-maxNumRepetitionCEmodeA >1*, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than the physical layer measurement period defined in Clause 8.16.2.2a.

### 8.16.2.3 E-UTRAN OTDOA Intra-Frequency RSTD Measurements for Cat-M2 UE in CEModeA

All intra-frequency RSTD measurement requirements specified in Sections 8.16.2.3 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All the measurement requirements specified in Sections 8.16.2.3 shall apply provided that the UE is configured:

- with the single PRS configuration for the reference cell and all the neighbour cells and
- with either the measurement gap pattern ID #0 specified in Clause 8.1.2.1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 for cat M2 RSTD measurements if the PRS bandwidth is less than the bandwidth of the cell used for the RSTD measurement in which case gaps are required.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.16.2.3.1 E-UTRAN FDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells,

including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqFDD,Cat_M}$ ms as given below (see also Figure 8.16.2.3.1-1):

$$T_{RSTDIntraFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms,}$$

where

$T_{RSTDIntraFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.16.2.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24],

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{actual_PRS} = N_{PRS}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{actual_PRS}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{actual_PRS}$ = (MGL-2) if MGRP$\geq N_{PRS}$ >(MGL-2), $N_{actual_PRS} = (MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$ if $N_{PRS}$ >MGRP, and $N_{actual_PRS} = N_{PRS}$ if $N_{PRS} \leq$(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.4.

$T_{PRS}$ $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.2.3.1-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |

| | |
|---|---|
| Note 1: | When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. |
| Note 2: | When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqFDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{n}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.23 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqFDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.16.2.3.1-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.4.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDIntraFreqFDD,Cat_M,HO}$ ) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,Cat_M,HO} = T_{RSTDIntraFreqFDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,Cat_M,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

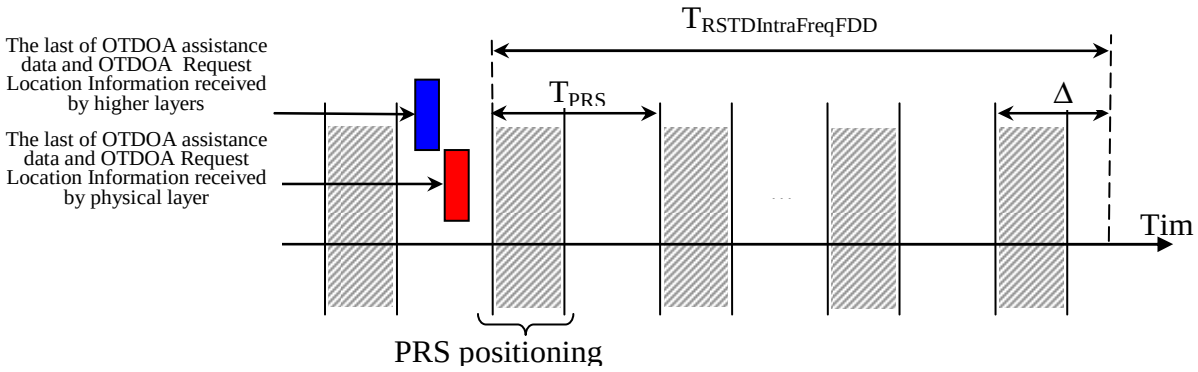


**Figure 8.16.2.3.1-1: Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.16.2.3.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.4.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqFDD,Cat_M}$ defined in Clause 8.16.2.3.1.

### 8.16.2.3.2 E-UTRAN TDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDIntraFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB},$$

where

$T_{RSTDIntraFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max( $T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.16.2.3.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\angle = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{\text{PRS}}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24],

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.4.

$\text{N}_{\text{actual_PF}}$ is the number of PRS subframes within a PRS occasion available at the UE; $\text{N}_{\text{actual_PF}} = N_{\text{PRS}}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $\text{N}_{\text{actual_PF}}$ is the number of PRS subframes which can be measured by UE within MGL, where $\text{N}_{\text{actual_PF}}$ = (MGL-2) if MGRP≥ $N_{\text{PRS}}$ >(MGL-2), $\text{N}_{\text{actual_PF}}$ = $(MGL-2) \cdot \left\lfloor N_{\text{PRS}} / MGRP \right\rfloor$ if $N_{\text{PRS}}$ >MGRP, and $\text{N}_{\text{actual_PF}} = N_{\text{PRS}}$ if $N_{\text{PRS}}$ ≤(MGL-2).

$T_{\text{PRS}}$ $N_{\text{PRS}}$, $\text{N}_{\text{actual_PF}}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$\text{T}_{\text{MIB}}$ is the time required for acquiring the MIB information of the target cell. $\text{T}_{\text{MIB}}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.2.3.1-1: Number of PRS positioning occasions within $\text{T}_{\text{RSTDIntraFreqTDD,Cat_M}}$**

| Positioning subframe configuration period $T_{\text{PRS}}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $\text{T}_{\text{RSTDIntraFreqTDD,Cat_M}}$ provided:

$\left(\text{PRS } \hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{i}$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{i}$ conditions apply for all subframes of at least $L = \frac{n}{2}$ PRS positioning occasions,

$\text{PRP } 1,2|_{\text{dBm}}$ according to Annex B.2.23 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.4.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDIntraFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDIntraFreqTDD,Cat_M,HO} = T_{RSTDIntraFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.16.2.3.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.16.2.3.2-2.

**Table 8.16.2.3.2-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6, | 1, 2, 3, 4 and 5 |
| 25 | 0, 1, 2, 3, 4, 5 and 6 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.16.2.3.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.4.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqTDD,Cat_M}$ defined in Clause 8.16.2.3.2.

#### 8.16.2.3.3 E-UTRAN HD-FDD Intra-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.16.2.3.1 also apply for this section except the reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.25.4 are available for RSTD measurements in the measured and reference cells.

##### 8.16.2.3.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.4.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period defined in Clause 8.16.2.3.3.

### 8.16.2.4 E-UTRAN OTDOA Inter-Frequency RSTD Measurements for Cat-M2 UE in CEModeA

All inter-frequency RSTD measurement requirements specified in Sections 8.16.2.4 shall apply, provided that

- the UE is capable of inter-frequency RSTD measurements for OTDOA [24], and
- either the measurement gap pattern ID # 0 specified in Table 8.1.2.1-1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 is used or the UE supports capability of conducting inter-frequency measurements without gaps.

All inter-frequency RSTD measurement requirements specified in Sections 8.16.2.4 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.25.1 are available for RSTD measurements in the measured and reference cell.

All the measurement requirements specified in Sections 8.16.2.4 shall apply provided that the UE is configured with the single PRS configuration for the reference cell and all the neighbour cells.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.16.2.4.1 E-UTRAN FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqFDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] ; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.16.2.4.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PRS}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PRS}$= $(MGL-2)\cdot\left\lfloor N_{PRS}/MGRP \right\rfloor$; $N_{actual_PRS}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.3.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.2.4.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,Cat_M}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.21 for a corresponding Band

$\text{PRS } \hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{\text{RSTDInterFreqTDD,Cat_M}}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.1.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$ ) shall be according to the following expression:

$$T_{\text{RSTDInterFreqTDD,Cat_M,HO}} = T_{\text{RSTDInterFreqTDD,Cat_M}} + K \times T_{\text{PRS}} + T_{\text{HO}} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$.

$T_{\text{HO}}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.16.2.4.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.1.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $\text{TTI}_{\text{DCCH}}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $\text{TTI}_{\text{DCCH.}}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{\text{RSTDInterFreqTDD,Cat_M}}$ defined in Clause 8.16.2.4.1.

### 8.16.2.4.2 E-UTRAN TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells,

including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \quad \text{ms},$$

where

$T_{RSTDInterFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] ; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.16.2.4.2-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PF}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PF}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PF}$= $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$; $N_{actual_PF}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.3.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PF}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.2.4.2-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,Cat_M}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-6 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-13 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.21 for a corresponding Band

$\text{PRS } \hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDInterFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.1.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{RSTDInterFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,Cat_M,HO} = T_{RSTDInterFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The inter-frequency requirements in this clause (8.16.2.4.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.16.2.4.2-2.

**Table 8.16.2.4.2-2: TDD uplink-downlink subframe configurations applicable for TDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| 24 | 0, 1, 2, 3, 4, 5 and 6 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.16.2.4.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.1.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDInterFreqTDD,Cat_M}$ defined in Clause 8.16.2.4.2.

### 8.16.2.4.3 E-UTRAN HD-FDD Inter-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.16.2.4.1 also apply for this section except reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.25.1 are available for RSTD measurements in the measured and reference cells.

#### 8.16.2.4.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.1.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period as defined in Clause 8.16.2.4.3.

## 8.16.3 Requirements for UE category M2 with CE mode B

### 8.16.3.1 E-UTRAN OTDOA Intra-Frequency RSTD Measurements for Cat-M2 UE in CEModeB

All intra-frequency RSTD measurement requirements specified in Sections 8.16.3.1 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All the measurement requirements specified in Sections 8.16.3.1 shall apply provided that the UE is configured:

- with the single PRS configuration for the reference cell and all the neighbour cells and
- with either the measurement gap pattern ID #0 specified in Clause 8.1.2.1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 for cat M2 RSTD measurements if the PRS bandwidth is less than the bandwidth of the cell used for the RSTD measurement in which case gaps are required.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.16.3.1.1 E-UTRAN FDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqFDD,Cat_M}$ ms as given below (see also Figure 8.16.3.1.1-1):

$$T_{RSTDIntraFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDIntraFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max($T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.16.3.1.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24],

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion available at the UE; $N_{actual_PRS} = N_{PRS}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $N_{actual_PRS}$ is the number of PRS subframes which can be measured by UE within MGL, where $N_{actual_PRS}$ = (MGL-2) if MGRP$\geq N_{PRS}$ >(MGL-2), $N_{actual_PRS} = (MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$ if $N_{PRS}$ >MGRP, and $N_{actual_PRS} = N_{PRS}$ if $N_{PRS} \leq$(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.5.

$T_{PRS}$ $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.3.1.1-1: Number of PRS positioning occasions within $T_{RSTDIntraFreqFDD,Cat_M}$**

| | Number of PRS positioning occasions $M$ |
|---|---|

| Positioning subframe configuration period $T_{PRS}$ | f1 Note1 | f1 and f2 Note2 |
|---|---|---|
| 160 ms | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $32 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| >160 ms | $8 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ | $16 \cdot \lceil N_{PRS_Total} / N_{actual_PRS} \rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1.<br>Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDIntraFreqFDD,Cat_M}$ provided:

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(PRS\hat{E}_s / Iot\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(PRS\ \hat{E}_s / Iot\right)_{ref}$ and $\left(PRS\hat{E}_s / Iot\right)_i$ conditions apply for all subframes of at least $L = \frac{n}{2}$ PRS positioning occasions,

$PRP\ 1,2|_{dBm}$ according to Annex B.2.23 for a corresponding Band

$PRS\ \hat{E}_s / Iot$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDIntraFreqFDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE as illustrated in Figure 8.16.3.1.1-1.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.5.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDIntraFreqFDD,Cat_M,HO}$ ) shall be according to the following expression:

$$T_{RSTDIntraFreqFDD,Cat_M,HO} = T_{RSTDIntraFreqFDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{RSTDIntraFreqFDD,Cat_M,HO}$.

$T_{HO}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

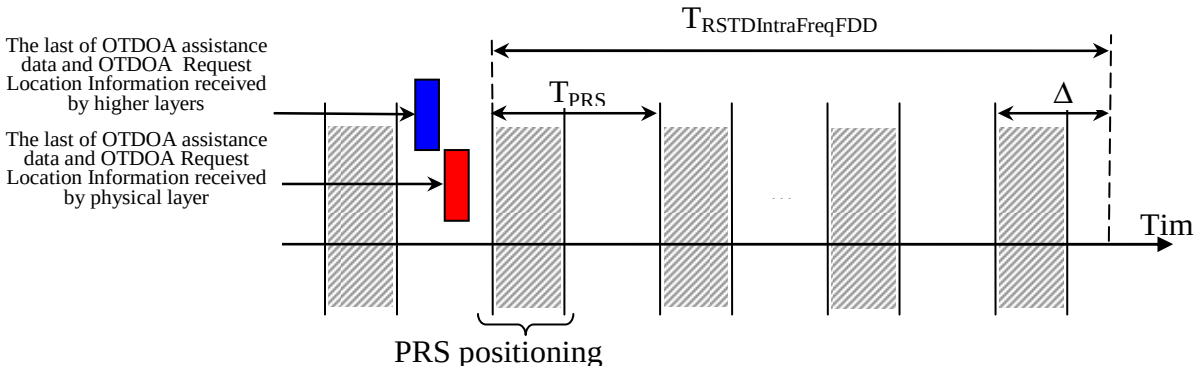


**Figure 8.16.3.1.1-1: Illustration of the RSTD reporting time requirement in an FDD system.**

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

### 8.16.3.1.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDIntraFreqFDD,Cat_M}$ defined in Clause 8.16.3.1.1.

### 8.16.3.1.2 E-UTRAN TDD Intra-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure intra-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDIntraFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDIntraFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB},$$

where

$T_{RSTDIntraFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] for UE not configured with measurement gaps for intra-frequency RSTD. For UE configured with measurement gaps for intra-frequency RSTD measurements, $T_{PRS}$= max( $T_{PRS}$, MGRP), where MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1.

$M$ is the number of PRS positioning occasions as defined in Table 8.16.3.1.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\angle = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{\text{PRS}}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24],

$\text{N}_{\text{actual_PRS}}$ is the number of PRS subframes within a PRS occasion available at the UE; $\text{N}_{\text{actual_PRS}} = N_{\text{PRS}}$ when the measurement gaps are not required for the intra-frequency RSTD measurements; for UE configured with measurement gaps for intra-frequency RSTD measurements $\text{N}_{\text{actual_PRS}}$ is the number of PRS subframes which can be measured by UE within MGL, where $\text{N}_{\text{actual_PRS}}$ = (MGL-2) if MGRP≥ $N_{\text{PRS}}$ >(MGL-2), $\text{N}_{\text{actual_PRS}}$ = $(MGL-2) \cdot \left\lfloor N_{\text{PRS}} / MGRP \right\rfloor$ if $N_{\text{PRS}}$ >MGRP, and $\text{N}_{\text{actual_PRS}} = N_{\text{PRS}}$ if $N_{\text{PRS}}$ ≤(MGL-2).

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.5.

$T_{\text{PRS}}$ $N_{\text{PRS}}$, $\text{N}_{\text{actual_PRS}}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$\text{T}_{\text{MIB}}$ is the time required for acquiring the MIB information of the target cell. $\text{T}_{\text{MIB}}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.3.1.2-1: Number of PRS positioning occasions within $\text{T}_{\text{RSTDIntraFreqTDD,Cat_M}}$**

| Positioning subframe configuration period $T_{\text{PRS}}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f1 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When only intra-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1. | | |
| Note 2: When intra-frequency RSTD and inter-frequency RSTD measurements are performed over cells belonging to the serving FDD carrier frequency f1 and one inter-frequency carrier frequency f2, respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $\text{T}_{\text{RSTDIntraFreqTDD,Cat_M}}$ provided:

$\left(\text{PRS } \hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{i}$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{\text{E}}_{\text{s}} / \text{Iot}\right)_{i}$ conditions apply for all subframes of at least $L = \frac{n}{2}$ PRS positioning occasions,

PRP $1,2|_{\text{dBm}}$ according to Annex B.2.23 for a corresponding Band

$\mathrm{PRS}\,\hat{E}_s / \mathrm{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{\mathrm{RSTDIntraFreqTDD,Cat_M}}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.5.

If the intra-frequency handover occurs while intra-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the intra-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ($T_{\mathrm{RSTDIntraFreqTDD,Cat_M,HO}}$) shall be according to the following expression:

$$T_{\mathrm{RSTDIntraFreqTDD,Cat_M,HO}} = T_{\mathrm{RSTDIntraFreqTDD,Cat_M}} + K \times T_{\mathrm{PRS}} + T_{\mathrm{HO}} \qquad ms,$$

where:

$K$ is the number of times the intra-frequency handover occurs during $T_{\mathrm{RSTDIntraFreqTDD,Cat_M,HO}}$,

$T_{\mathrm{HO}}$ is the time during which the intra-frequency RSTD measurement may not be possible due to intra-frequency handover.

Furthermore, due to the intra-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The intra-frequency requirements in this clause (8.16.3.1.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.16.3.1.2-2.

**Table 8.16.3.1.2-2: TDD uplink-downlink subframe configurations applicable for TDD intra-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| 25 | 0, 1, 2, 3, 4, 5 and 6 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.16.3.1.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $\mathrm{TTI}_{\mathrm{DCCH}}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $\mathrm{TTI}_{\mathrm{DCCH}}$. This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{\mathrm{RSTDIntraFreqTDD,Cat_M}}$ defined in Clause 8.16.3.1.2.

#### 8.16.3.1.3 E-UTRAN HD-FDD Intra-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.16.3.1.1 also apply for this section except the reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.25.5 are available for RSTD measurements in the measured and reference cells.

##### 8.16.3.1.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.5.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period defined in Clause 8.16.3.1.3.

### 8.16.3.2 E-UTRAN OTDOA Inter-Frequency RSTD Measurements for Cat-M2 UE in CEModeB

All inter-frequency RSTD measurement requirements specified in Sections 8.16.3.2 shall apply, provided that

- the UE is capable of inter-frequency RSTD measurements for OTDOA [24], and
- either the measurement gap pattern ID # 0 specified in Table 8.1.2.1-1 or any applicable measurement gap pattern specified in Table 8.1.2.1-3 is used or the UE supports capability of conducting inter-frequency measurements without gaps.

All inter-frequency RSTD measurement requirements specified in Sections 8.16.3.2 shall apply without DRX as well as for any DRX and eDRX_CONN cycles specified in TS 36.331 [2].

All positioning subframes indicated in the OTDOA assistance data and specified in sub-clause 9.1.25.2 are available for RSTD measurements in the measured and reference cell.

All the measurement requirements specified in Sections 8.16.3.2 shall apply provided that the UE is configured with the single PRS configuration for the reference cell and all the neighbour cells.

If CRS muting is enabled in a cell for which the UE performs RSTD measurements, the UE capable of supporting CRS muting [31] shall perform RSTD measurements and meet all the requirements in this section, provided the CRS are available within at least the PRS bandwidth in the subframes with PRS during all positioning occasions within the RSTD measurement period.

#### 8.16.3.2.1 E-UTRAN FDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least $n$=16 cells, including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqFDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqFDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \text{ ms},$$

where

$T_{RSTDInterFreqFDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] ; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.16.3.2.1-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\angle = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355 [24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PRS}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PRS}$= $(MGL-2)\cdot\left\lfloor N_{PRS}/MGRP \right\rfloor$; $N_{actual_PRS}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.2.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.3.2.1-1: Number of PRS positioning occasions within $T_{RSTDInterFreqFDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total}/N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqFDD,Cat_M}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1{,}2|_{\text{dBm}}$ according to Annex B.2.21 for a corresponding Band

$\text{PRS } \hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{\text{RSTDInterFreqTDD,Cat_M}}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.2.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$ ) shall be according to the following expression:

$$T_{\text{RSTDInterFreqTDD,Cat_M,HO}} = T_{\text{RSTDInterFreqTDD,Cat_M}} + K \times T_{\text{PRS}} + T_{\text{HO}} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{\text{RSTDInterFreqTDD,Cat_M,HO}}$.

$T_{\text{HO}}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

#### 8.16.3.2.1.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.2.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $\text{TTI}_{\text{DCCH}}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $\text{TTI}_{\text{DCCH}}$. This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{\text{RSTDInterFreqTDD,Cat_M}}$ defined in Clause 8.16.3.2.1.

### 8.16.3.2.2 E-UTRAN TDD Inter-Frequency OTDOA Measurements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-frequency RSTD, specified in TS 36.214 [4], for at least *n*=16 cells,

including the reference cell, on the same carrier frequency f1 as that of the reference cell within $T_{RSTDInterFreqTDD,Cat_M}$ ms as given below:

$$T_{RSTDInterFreqTDD,Cat_M} = T_{PRS} \cdot (M-1) + \Delta + T_{MIB} \quad \text{ms},$$

where

$T_{RSTDInterFreqTDD,Cat_M}$ is the total time for detecting and measuring at least *n* cells,

$T_{PRS}$ is the cell-specific positioning subframe configuration period as defined in TS 36.355 [24] ; if $T_{PRS}$<MGRP, $T_{PRS}$ equals to MGRP; MGRP is the Measurement Gap Repetition Period as defined in section 8.1.2.1,

$M$ is the number of PRS positioning occasions as defined in Table 8.16.3.2.2-1, where downlink positioning subframes defined in TS 36.211 [16], and

$\Delta = T_{PRS} \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time and the processing time,

$N_{PRS}$ is the cell-specific number of PRS subframes within a PRS occasion as defined in TS 36.355[24];

$N_{actual_PRS}$ is the number of PRS subframes within a PRS occasion that can be measured by UE within MGL; if MGRP>= $N_{PRS}$ >(MGL-2ms), $N_{actual_PRS}$=(MGL-2ms); if $N_{PRS}$ >MGRP, $N_{actual_PRS}$= $(MGL-2) \cdot \left\lfloor N_{PRS} / MGRP \right\rfloor$; $N_{actual_PRS}$= $N_{PRS}$ if $N_{PRS}$ ≤(MGL-2);

$N_{PRS_total}$ is the minimum number of PRS subframes per cell measurement as specified in Section 9.1.25.2.

$T_{PRS}$, $N_{PRS}$, $N_{actual_PRS}$ and $N_{PRS_total}$ are the parameters of the same cell, for which $T_{PRS} \cdot \left\lceil \frac{N_{PRS_total}}{N_{actual_PRS}} \right\rceil$ is the largest among all the measured cells.

$T_{MIB}$ is the time required for acquiring the MIB information of the target cell. $T_{MIB}$ = 0 if the SFN of at least one cell in OTDOA assistance data is known to the UE.

**Table 8.16.3.2.2-1: Number of PRS positioning occasions within $T_{RSTDInterFreqTDD,Cat_M}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions $M$ | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $32 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| >160 ms | $8 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ | $16 \cdot \left\lceil N_{PRS_Total} / N_{actual_PRS} \right\rceil$ |
| Note 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2. | | |
| Note 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells *i* out of at least (*n*-1) neighbor cells within $T_{RSTDInterFreqTDD,Cat_M}$ provided:

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ ≥-15 dB for all Frequency Bands for the reference cell,

$\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ ≥-15 dB for all Frequency Bands for neighbour cell *i*,

$\left(\text{PRS } \hat{E}_s / \text{Iot}\right)_{ref}$ and $\left(\text{PRS}\hat{E}_s / \text{Iot}\right)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP $1,2|_{dBm}$ according to Annex B.2.21 for a corresponding Band

$\text{PRS } \hat{E}_s / \text{Iot}$ is defined as the ratio of the average received energy per PRS RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs which carry PRS.

The time $T_{RSTDInterFreqTDD,Cat_M}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in the sub-clause 9.1.25.2.

If the inter-frequency handover occurs while inter-frequency RSTD measurements are being performed then the UE shall complete the ongoing OTDOA measurement session. The UE shall also meet the inter-frequency OTDOA measurement and accuracy requirements. However in this case the RSTD measurement period ( $T_{RSTDInterFreqTDD,Cat_M,HO}$) shall be according to the following expression:

$$T_{RSTDInterFreqTDD,Cat_M,HO} = T_{RSTDInterFreqTDD,Cat_M} + K \times T_{PRS} + T_{HO} \qquad ms,$$

where:

$K$ is the number of times the inter-frequency handover occurs during $T_{RSTDInterFreqTDD,Cat_M,HO}$,

$T_{HO}$ is the time during which the inter-frequency RSTD measurement may not be possible due to inter-frequency handover.

Furthermore, due to the inter-frequency handover the UE shall meet the RSTD measurement accuracy for a PRS bandwidth which is not larger than the minimum channel bandwidth of all the PCells during the RSTD measurement period.

The inter-frequency requirements in this clause (8.16.3.2.2) shall apply for all TDD special subframe configurations specified in TS 36.211 [16] and for the TDD uplink-downlink configurations as specified in Table 8.16.3.2.2-2.

**Table 8.16.3.2.2-2: TDD uplink-downlink subframe configurations applicable for TDD inter-frequency requirements**

| PRS Transmission Bandwidth [RB] | Applicable TDD uplink-downlink configurations |
|---|---|
| 6 | 1, 2, 3, 4 and 5 |
| 24 | 0, 1, 2, 3, 4, 5 and 6 |
| Note: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [16]. | |

#### 8.16.3.2.2.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.2.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than $T_{RSTDInterFreqTDD,Cat_M}$ defined in Clause 8.16.3.2.2.

### 8.16.3.2.3 E-UTRAN HD-FDD Inter-Frequency OTDOA Measurements

The requirements in this section are applicable for the UE which supports half duplex operation on one or more supported frequency bands [2].

The requirements defined in clause 8.16.3.2.1 also apply for this section except reporting delay requirement provided the following conditions are met:

- all positioning subframes indicated in the OTDOA assistance data and specified in Section 9.1.25.2 are available for RSTD measurements in the measured and reference cells.

#### 8.16.3.2.3.1 RSTD Measurement Reporting Delay

Reported measurement contained in event triggered measurement reports shall meet the requirements in sections 9.1.25.2.

The UE shall not send any measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between the point when UE receive both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message as specified in TS 36.355 [24], and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $N_{rep}$x $TTI_{DCCH}$, where $N_{rep}$ [21] is the maximum number of PUSCH repetitions configured for the UE, othwerwise uncertainty is defined as 2 x $TTI_{DCCH.}$ This measurement reporting delay excludes a delay which caused by no UL resoureces for UE to send the measurement report.

The measurement reporting delay shall be less than measurement period as defined in Clause 8.16.3.2.3.

# 8.17 Measurements for E-UTRA – NR Dual Connectivity

## 8.17.1 Introduction

This clause contains requirements for UE supporting dual connectivity with E-UTRA PCell and NR PSCell.

Requirements in this clause are applicable to UEs which have been configured with EN-DC. Requirements in this clause are applicable to both E-UTRA FDD and E-UTRA TDD PCell in combination with an NR PSCell.

### 8.17.1.1 Measurement Gap Sharing

For UE configured with per-UE measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on NR intra-frequency carriers or when SMTC configured for NR intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on E-UTRA gap-needed inter-frequency carriers, NR inter-frequency carriers including SSB and CSI-RS, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on NR FR1 intra-frequency carriers or when SMTC configured for NR FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on E-UTRA gap-needed inter-frequency carriers, NR inter-frequency carriers including SSB and CSI-RS, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

In this clause, NR intra-freuqency or NR inter-frequency measurement is defined respective to NR serving carriers as specified in clauses 9.2 and 9.3 of TS 38.133 [50], which is also inter-RAT measurement respective to E-UTRA serving carriers.

When network signals “01”, “10” or “11” with RRC parameter *measGapSharingScheme* [2] and the value of X is defined as in Table 8.17.1.1-1, and Kinter = 1 / (100 – X) * 100.

When network signals “00” indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.1 of TS 38.133 [50]

**Table 8.17.1.1-1: Value of parameter X for EN-DC measurement gap sharing**

| ***measGapSharingScheme*** | **Value of X (%)** |
|---|---|
| ‘00’ | Equal splitting |
| ‘01’ | 25 |
| ‘10’ | 50 |
| ‘11’ | 75 |
| Note: It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field. | |

## 8.17.1A Intrafrequency Measurements

PCC intra-frequency measurements shall meet all applicable requirements in clause 8.1.2.2. If MCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the MCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

SCC intra-frequency measurements shall meet all applicable requirements in clause 8.3.3. If MCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the MCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

## 8.17.2 SFTD Measurements

### 8.17.2.1 Introduction

This clause contains SFTD measurement requirements on UE capabilities for support of EN-DC in RRC_CONNECTED state. The overall delay includes RRC procedure delay to be defined in clause 11.2 in TS 36.331 [2], and SFTD measurement reporting delay in clause 8.17.2.3.

### 8.17.2.2 SFTD Measurement requirements

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1}$ = max(200, 5 x SMTC period) ms.

When DRX is used in either of the E-UTRA PCell or the NR PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in table 8.17.2.2-1.

**Table 8.17.2.2-1: SFTD measurement requirement when DRX is used**

| **DRX cycle length (s)** Note 3 | **$T_{measure_SFTD1}$ (s)** |
|---|---|
| ≤0.04 | max(0.2,5 x SMTC period) (Note1) |
| 0.04<DRX cycle≤0.32 | 8 x max(DRX cycle, SMTC period) |
| 0.32<DRX cycle≤10.24 | 5 x DRX cycle |

| | |
|---|---|
| Note 1: | Number of DRX cycles depends upon the DRX cycle in use |
| Note 2: | (Void) |
| Note 3: | DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell. |

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_ENDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period ($T_{measure_SFTD2}$), and

$T_{PSCell_change_ENDC}$ is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.27.

## 8.17.2.2.a SFTD Measurement requirements with CCA on target frequency

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1}$ = max(200 ms, (5 + L) x SMTC period), where L is the number of SSBs (or DRSs) blocked by unsuccessful CCA. $L_{max}$ is the maximum value of L (i.e., $L \leqslant L_{max}$) and is defined in Table 8.17.2.2.a-2.

When DRX is used in either of the E-UTRA PCell or the NR PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in table 8.17.2.2.a-1.

In the requirements of clause 8.17.2.2.a, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but the first two successive candidate SSB positions for the same SS/PBCH block index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period; otherwise the SMTC occasion is considered as available at the UE.

**Table 8.17.2.2.a-1: SFTD measurement requirement when DRX is used**

| DRX cycle length (s) Note 3 | $T_{measure_SFTD1}$ (s) |
|---|---|
| ≤0.04 | max(0.2,(5 + L) x SMTC period) (Note1) |
| 0.04<DRX cycle≤0.32 | (8 + L) x max(DRX cycle, SMTC period) |
| 0.32<DRX cycle≤10.24 | (5 + L) x DRX cycle |
| Note 1: Number of DRX cycles depends upon the DRX cycle in use.<br>Note 2: DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell.<br>Note 3: L is the total number of SMTC occasions not available at the UE. The maximum value of L, $L_{max}$, is defined in Table 8.17.2.2.a-2.<br>Note 3: L is the total number of SMTC occasions not available at the UE. The maximum value of L, $L_{max}$, is defined in Table 8.17.2.2.a-2. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. | |

**Table 8.17.2.2.a-2: Maximum number of missed DRS occasions**

| Condition | $L_{max}$ |
|---|---|

| | |
|---|---|
| max(DRX cycle, SMTC period) ≤ 40 ms | 7 |
| 40 ms < max(DRX cycle, SMTC period) ≤ 320 ms | 5 |
| DRX cycle > 320 ms | 3 |
| Note 1: DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell. When no DRX is used in both PCell and PSCell, DRX cycle = 0.<br>Note 2: The SMTC period is the one used by PSCell. | |

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_ENDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period ($T_{measure_SFTD2}$), and

$T_{PSCell_change_ENDC}$ is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

When L exceeds $L_{max}$, the UE shall terminate the SFTD measurement.

The time difference between frame timing acquisition for PCell and PSCell, $t_1$ and $t_2$ respectively, shall fulfill $|t_1-t_2| <$ max(200 ms, $5*T_{SMTC}$), where $T_{SMTC}$ is the SMTC period of PSCell. Otherwise the UE shall invalidate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 9.1.28.

### 8.17.2.3 SFTD Measurement Reporting Delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report. When the UE is configured to perform LTE SRS carrier-based switching or NR SRS carrier based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

The SFTD measurement reporting delay shall be less than measurement period defined in clause 8.17.2.2.

## 8.17.3 E-UTRA Inter-frequency Measurements when Configured with E-UTRA-NR Dual Connectivity Operation

### 8.17.3.1 Introduction

The E-UTRAN inter frequency measurement requirements defined in section 8.17.3 shall apply when the UE capable of EN-DC is operating in EN-DC mode. The requiremenents in section 8.17.3 are applicable for gap pattern id # 0, 1, 2, 3, 4, 6, 7, 8, 10 as defined specified in Table 8.1.2.1-1.

When per-UE measurement gap is configured, the scaling factor $CSSF_{E\text{-}UTRA,\ NSA}$ used in the E-UTRAN inter frequency measurement requirements for the UE configured with EN-DC mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When per-FR gap is configured, the scaling factor $CSSF_{E\text{-}UTRA,\ NSA}$ shall

exclude the frequencies not on the corresponding frequency range. When the UE is not configured with EN-DC mode then the E-UTRAN inter frequency measurement requirements defined in section 8.1.2.3 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

## 8.17.3.2 E-UTRAN FDD inter frequency measurements

### 8.17.3.2.1 E-UTRAN FDD inter frequency measurements when no DRX is used

#### 8.17.3.2.1.1 Introduction

The requirements in this section shall apply for E-UTRAN FDD-FDD inter frequency measurements and for E-UTRAN TDD-FDD inter frequency measurements when the UE is operating in EN-DC mode.

#### 8.17.3.2.1.2 Requirements

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, then the UE shall be able to identify a new FDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{E\text{-}UTRA,NSA} \quad ms$$

Where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD inter-frequency cell is defined.

$T_{inter1}$ is defined in clause 8.1.2.1.

A cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When measurement gaps are scheduled for FDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively, with measurement period given by table 8.17.3.2.1.2-1.

**Table 8.17.3.2.1.2-1: Measurement period and measurement bandwidth**

| Configuration | Physical Layer Measurement period: $T_{Measurement_Period_Inter_FDD}$ [ms] | Measurement bandwidth [RB] |
|---|---|---|
| 0 | 480 x $CSSF_{E\text{-}UTRA, NSA}$ | 6 |
| 1 (Note 1) | 240 x $CSSF_{E\text{-}UTRA, NSA}$ | 50 |
| Note 1: This configuration is optional | | |

The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency for up to 6 FDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period defined in Table 8.17.3.2.2-1.

#### 8.17.3.2.1.3 Measurement Reporting Requirements

##### 8.17.3.2.1.3.1 Periodic Reporting

Reported RSRP, RSRQ and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

##### 8.17.3.2.1.3.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.3.2.1.3.3.

##### 8.17.3.2.1.3.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify\ Inter}$ defined in clause 8.17.3.2.1 When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period, $T_{Identify\ Inter}$ defined in clause 8.17.3.2.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_Inter_FDD}$ defined in clause 8.17.3.2.1 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.3.2.2 E-UTRAN FDD inter frequency measurements when DRX is used

#### 8.17.3.2.2.1 Introduction

The requirements in this section shall apply for E-UTRAN FDD-FDD inter frequency measurements and for E-UTRAN TDD-FDD inter frequency measurements when the UE is operating in EN-DC mode.

#### 8.17.3.2.2.2 Requirements

When DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN FDD inter frequency cell within $T_{Identify\ Inter}$. When DRX is in use, $T_{identify_inter}$ is as defined in Table 8.17.3.2.2.2-1, and when eDRX_CONN is in use, $T_{Identify\ Inter}$ is as defined in Table 8.17.3.2.2.2-1A. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.3.2.2.2-1: Requirement to identify a newly detectable FDD interfrequency cell**

| DRX cycle length (s) | $T_{identify_inter}$ (s) (DRX cycles) | |
|---|---|---|
| | **Gap period = 40 ms, 20 ms** | **Gap period = 80 ms** |
| ≤ 0.16 | Non DRX Requirements in clause 8.17.3.1 are applicable | Non DRX Requirements in clause 8.17.3.1 are applicable |

| | | |
|---|---|---|
| 0.256 | 5.12* $CSSF_{E\text{-}UTRA,\ NSA}$ (20* $CSSF_{E\text{-}UTRA,\ NSA}$) | 7.68* $CSSF_{E\text{-}UTRA,\ NSA}$ (30* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| 0.32 | 6.4* $CSSF_{E\text{-}UTRA,\ NSA}$ (20* $CSSF_{E\text{-}UTRA,\ NSA}$) | 7.68* $CSSF_{E\text{-}UTRA,\ NSA}$ (24* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| 0.32< DRXcycle ≤2.56 | Note (20* $CSSF_{E\text{-}UTRA,\ NSA}$) | Note (20* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.3.2.2.2-1A: Requirement to identify a newly detectable FDD inter-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_inter}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | Gap period = 40 ms, 20 ms | Gap period = 80 ms |
| 2.56< eDRX_CONN cycle≤10.24 | Note (20* $CSSF_{E\text{-}UTRA,\ NSA}$) | Note (20* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- $SCH_RP|_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per FDD inter-frequency and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.17.3.2.2.2-2, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.17.3.2.2.2-3. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.3.2.2.2-2: Requirement to measure FDD interfrequency cells**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.08 | Non DRX Requirements in clause 8.17.3.1 are applicable |
| 0.08<DRX-cycle≤2.56 | Note (5* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the DRX cycle in use | |

**Table 8.17.3.2.2.2-3: Requirement to measure FDD inter-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note (5* $CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.1 and 9.1.3.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.1 and 9.1.6.2, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.17.3.1 and 9.1.17.3.2.

### 8.17.3.3.2.3 Measurement Reporting Requirements

#### 8.17.3.3.2.3.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

#### 8.17.3.3.2.3.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.3.3.2.3.3.

#### 8.17.3.3.2.3.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter}$ defined in clause 8.17.3.2.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify\ Inter}$ defined in clause 8.17.3.2.2 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure_Inter}$ defined in clause 8.17.3.2.2 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform SRS carrier based switching, an additional delay can be expected.

### 8.17.3.3 E-UTRAN TDD inter frequency measurements

#### 8.17.3.3.1 E-UTRAN TDD inter frequency measurements when no DRX is used

##### 8.17.3.3.1.1 Introduction

The requirements in this section shall apply for E-UTRAN TDD-TDD inter frequency measurements and for E-UTRAN FDD-TDD inter frequency measurements when the UE is operating in EN-DCmode.

##### 8.17.3.3.1.2 Requirements

When measurement gaps are scheduled, or the UE supports capability of conducting such measurements without gaps, then the UE shall be able to identify a new TDD inter-frequency within $T_{Identify_Inter}$ according to the following expression:

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{E\text{-}UTRA,NSA} \quad ms$$

Where:

$T_{Basic_Identify_Inter}$ = 480 ms. It is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new TDD inter-frequency cell is defined.

$T_{inter1}$ is defined in clause 8.1.2.1.

A cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Sections 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,

- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,
- SCH_RP$|_{dBm}$ and SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When measurement gaps are scheduled for TDD inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively, with measurement period given by table 8.17.3.3.1.2-1.

**Table 8.17.3.3.1.2-1: $T_{Measurement_Period_TDD_Inter}$ for different configurations**

| Configuration | Measurement bandwidth [RB] | Number of UL/DL sub-frames per half frame (5 ms) | | DwPTS | | $T_{Measurement_Period_TDD_Inter}$ [ms] |
|---|---|---|---|---|---|---|
| | | DL | UL | Normal CP | Extended CP | |
| 0 | 6 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 480 x $CSSF_{E\text{-}UTRA,\ NSA}$ |
| 1 (Note 1) | 50 | 2 | 2 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 240 x $CSSF_{E\text{-}UTRA,\ NSA}$ |
| 2 | 6 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 720 x $CSSF_{E\text{-}UTRA,\ NSA}$ |
| 3 (Note 1) | 50 | 1 | 3 | $19760 \cdot T_s$ | $20480 \cdot T_s$ | 480 x $CSSF_{E\text{-}UTRA,\ NSA}$ |
| Note 1: This configuration is optional<br>Note 2: $T_s$ is defined in TS 36.211 [16] | | | | | | |

The UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per TDD inter-frequency for up to 6 TDD inter-frequencies and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period defined in Table 8.17.3.3.1.2-1.

### 8.17.3.3.1.3 Measurement Reporting Requirements

#### 8.17.3.3.1.3.1 Periodic Reporting

Reported RSRP, RSRQ and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

#### 8.17.3.3.1.3.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.3.3.1.3.3.

#### 8.17.3.3.1.3.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{Identify\ Inter}$ defined in clause 8.17.3.3.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR

gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period, $T_{Identify\ Inter}$ defined in clause 8.17.3.3.1 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measurement_Period_Inter_TDD}$ defined in clause 8.17.3.3.1 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap,, an additional delay can be expected.

### 8.17.3.3.2 E-UTRAN TDD inter frequency measurements when DRX is used

#### 8.17.3.3.2.1 Introduction

The requirements in this section shall apply for E-UTRAN TDD-TDD inter frequency measurements and for E-UTRAN FDD-TDD inter frequency measurements when the UE is operating in EN-DCmode. If the UE is not yet configured with the EN-DC operation then the UE shall meet the E-UTRAN TDD-TDD inter frequency measurement requirements and E-UTRAN FDD-TDD inter frequency measurement requirements defined in section 8.1.2.3.2 and 8.1.2.3.4 respectively.

#### 8.17.3.3.2.2 Requirements

When DRX or eDRX_CONN is in use, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable E-UTRAN TDD inter frequency cell within $T_{Identify\ Inter}$. When DRX is in use, $T_{identify_inter}$ is as defined in Table 8.17.3.3.2.2-1, and when eDRX_CONN is in use, $T_{Identify\ Inter}$ is as defined in Table 8.17.3.3.2.2-1A. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.3.3.2.2-1: Requirement to identify a newly detectable TDD interfrequency cell**

| DRX cycle length (s) | $T_{Identify\ Inter}$ (s) (DRX cycles) | |
|---|---|---|
| | **Gap period = 40 ms, 20 ms** | **Gap period = 80 ms** |
| ≤ 0.16 | Non DRX Requirements in clause 8.17.3.1 are applicable | Non DRX Requirements in clause 8.17.3.1 are applicable |
| 0.256 | 5.12*$CSSF_{E\text{-}UTRA,\ NSA}$ (20*$CSSF_{E\text{-}UTRA,\ NSA}$) | 7.68*$CSSF_{E\text{-}UTRA,\ NSA}$ (30*$CSSF_{E\text{-}UTRA,\ NSA}$) |
| 0.32 | 6.4*$CSSF_{E\text{-}UTRA,\ NSA}$ (20*$CSSF_{E\text{-}UTRA,\ NSA}$) | 7.68*$CSSF_{E\text{-}UTRA,\ NSA}$ (24*$CSSF_{E\text{-}UTRA,\ NSA}$) |
| 0.32< DRXcycle ≤2.56 | Note (20* $CSSF_{E\text{-}UTRA,\ NSA}$) | Note (20*$CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.3.3.2.2-1A: Requirement to identify a newly detectable TDD inter-frequency cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{Identify\ Inter}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | **Gap period = 40 ms, 20 ms** | **Gap period = 80 ms** |
| 2.56< eDRX_CONN cycle≤10.24 | Note (20*$CSSF_{E\text{-}UTRA,\ NSA}$) | Note (20*$CSSF_{E\text{-}UTRA,\ NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered detectable provided following conditions are fulfilled:

- $RSRP|_{dBm}$ and RSRP Ês/Iot according to Annex B.2.3 for a corresponding Band,
- other RSRP related side conditions given in Clause 9.1.3.1 and 9.1.3.2 are fulfilled for a corresponding Band,
- RSRQ related side conditions given in Sections 9.1.6.1 and 9.1.6.2 are fulfilled for a corresponding Band,
- RS-SINR related side conditions given in Sections 9.1.17.3.1 and 9.1.17.3.2 are fulfilled for a corresponding Band,

- $SCH_RP|_{dBm}$ SCH Ês/Iot according to Annex B.2.3 for a corresponding Band.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing RSRP, RSRQ, and RS-SINR measurements of at least 4 inter-frequency cells per TDD inter-frequency and the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{measure_inter}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. When DRX is used, $T_{measure_inter}$ is as defined in Table 8.17.3.3.2.2-2, and when eDRX_CONN is in use, $T_{measure_inter}$ is as defined in Table 8.17.3.3.2.2-3. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.3.3.2.2-2: Requirement to measure TDD interfrequency cells**

| DRX cycle length (s) | $T_{measure_inter}$ (s) (DRX cycles) |
|---|---|
| ≤ 0.08 | Non DRX Requirements in clause 8.17.3.1 are applicable |
| 0.08<DRX-cycle≤2.56 | Note ($5*CSSF_{E-UTRA, NSA}$) |
| Note: Time depends upon the DRX cycle in use | |

**Table 8.17.3.3.2.2-3: Requirement to measure TDD inter-frequency cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_inter}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5*CSSF_{E-UTRA, NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The RSRP measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.3.1 and 9.1.3.2, the RSRQ measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.6.1 and 9.1.6.2, and the RS-SINR measurement accuracy for all measured cells shall be as specified in the sub-clauses 9.1.17.3.1 and 9.1.17.3.2.

### 8.17.3.3.2.3 Measurement Reporting Requirements

#### 8.17.3.3.2.3.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

#### 8.17.3.3.2.3.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.3.3.2.3.3.

#### 8.17.3.3.2.3.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in sections 9.1.3.1, 9.1.3.2, 9.1.6.1, 9.1.6.2, 9.1.17.3.1 and 9.1.17.3.2, respectively.

The UE shall not send any event triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify_inter}$ defined in clause 8.17.3.3.2.3. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify\ Inter}$ defined in clause 8.17.3.3.2.3 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure_Inter}$ defined in clause 8.17.3.3.2.3 provided the timing to that cell has not changed more than ± 50 Ts while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

## 8.17.4 E-UTRA Inter-RAT NR Measurements when Configured with E-UTRA-NR Dual Connectivity Operation

### 8.17.4.1 E-UTRAN FDD – NR measurements when configured with E-UTRA-NR Dual connectivity

Requirements in this clause apply for the NR capable UE configured with inter-RAT measurement on NR. For UE supporting EN-DC operation, the requirements in this clause shall apply when NR PSCell is configured. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD - NR measurement requirements defined in section 8.1.2.4.21 shall apply. When the E-UTRAN FDD-NR measurement object configured by E-UTRA PCell is on an NR serving frequency carrier, then the NR intra-frequency measurements requirements defined in clause 9.2 of TS 38.133 [50] shall apply. The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

The UE shall be able to identify new inter-RAT NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT NR cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

An NR cell is considered detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in clause 9.11.1 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50],
- NR SS-RSRQ related conditions in the accuracy requirements in clause 9.11.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50],
- NR SS-SINR related conditions in the accuracy requirements in clause 9.11.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 of TS 38.133 [50].

The NR SS-RSRP measurement accuracy for all measured NR cells shall be as specified in clause 9.11.1, the NR SS-RSRQ measurement accuracy for all measured NR cells shall be as specified in clause 9.11.2, and NR SS-SINR measurement accuracy for all measured NR cells shall be as specified in clause 9.11.3.

#### 8.17.4.1.1 NR Inter-RAT cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter-RAT NR cell within $T_{identify_NR_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter-RAT NR cell within $T_{identify_NR_with_index}$. The UE shall be able to identify a new detectable inter-RAT NR SS block of an already detected cell within $T_{identify_inter_without_index}$.

$$T_{identify_NR_without_index} = (T_{PSS/SSS_sync_NR} + T_{SSB_measurement_period_NR})\ ms$$

$$T_{identify_NR_with_index} = (T_{PSS/SSS_sync_NR} + T_{SSB_measurement_period_NR} + T_{SSB_time_index_NR})\ ms$$

Where:

$T_{PSS/SSS_sync_NR}$: it is the time period used in PSS/SSS detection given in table 8.17.4.1.1-1 and table 8.17.4.1.1-2.

$T_{SSB_time_index_NR}$: it is the time period used to acquire the index of the SSB being measured given in table 8.17.4.1.1-3 and table 8.17.4.1.1-4.

$T_{SSB_measurement_period_NR}$: equal to a measurement period of SSB based measurement given in table 8.17.4.1.2-1 and table 8.17.4.1.2-2.

$M_{pss/sss_sync_NR}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_NR}$=64 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{pss/sss_sync_NR}$=40 samples. For a UE supporting FR2 power class 3 (handheld), $M_{pss/sss_sync_NR}$=40 samples. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_NR}$ = 40 samples.

$M_{SSB_index_NR}$: For a UE supporting FR2 power class 1, $M_{SSB_index_NR}$ = 40 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{pss/sss_sync_NR}$ = 24 samples. For a UE supporting FR2 power class 3 (handheld), $M_{SSB_index_NR}$ = 24 samples. For a UE supporting FR2 power class 4, $M_{meas_period_NR}$ = 24 samples.

$M_{meas_period_NR}$: For a UE supporting FR2 power class 1, $M_{meas_period_NR}$=64 samples. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{pss/sss_sync_NR}$=40 samples. For a UE supporting FR2 power class 3 (handheld), $M_{meas_period_NR}$=40 samples. For a UE supporting FR2 power class 4, $M_{meas_period_NR}$ = 40 samples.

$CSSF_{NR,EN\text{-}DC}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ defined in clause 9.1.5.2.1 of TS 38.133 [50] for measurement conducted within measurement gaps in EN-DC mode.

**Table 8.17.4.1.1-1: Time period for PSS/SSS detection (Frequency range FR1)**

| Condition NOTE1,2 | $T_{PSS/SSS_sync_NR}$ |
|---|---|
| No DRX | Max(600ms, 8 × Max(MGRP, SMTC period)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle ≤ 320ms | Max(600ms, Ceil(8×1.5) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle > 320ms | 8 × DRX cycle × $CSSF_{NR,EN\text{-}DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

**Table 8.17.4.1.1-2: Time period for PSS/SSS detection (Frequency range FR2)**

| Condition NOTE1,2 | $T_{PSS/SSS_sync_NR}$ |
|---|---|
| No DRX | Max(600ms, $M_{pss/sss_sync_NR}$ × Max(MGRP, SMTC period)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle ≤ 320ms | Max(600ms, (1.5 × $M_{pss/sss_sync_NR}$) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle > 320ms | $M_{pss/sss_sync_NR}$ × DRX cycle × $CSSF_{NR,EN\text{-}DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

**Table 8.17.4.1.1-3: Time period for time index detection (Frequency range FR1)**

| Condition NOTE1,2 | $T_{SSB_time_index_NR}$ |
|---|---|
| No DRX | Max(120ms, 3 × Max(MGRP, SMTC period)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle ≤ 320ms | Max(120ms, Ceil(3 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle > 320ms | 3 × DRX cycle × $CSSF_{NR,EN\text{-}DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

**Table 8.17.4.1.1-4: Time period for time index detection (Frequency range FR2)**

| Condition NOTE1,2 | $T_{SSB_time_index_NR}$ |
|---|---|
| No DRX | Max(200ms, $M_{SSB_index_NR}$ × Max(MGRP, SMTC period)) × $CSSF_{NR,EN\text{-}DC}$ |

| | |
|---|---|
| DRX cycle ≤ 320ms | Max(200ms, (1.5 × $M_{SSB_index_NR}$) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle > 320ms | $M_{SSB_index_NR}$ × DRX cycle × $CSSF_{NR,EN-DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

### 8.17.4.1.2 NR Inter-RAT measurement

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting NR SS-RSRP, NR SS-RSRQ and NR SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 9.11.1, 9.11.2 and 9.11.3, respectively, with a measurement period given by:

**Table 8.17.4.1.2-1: Measurement period for NR inter-RAT measurements with gaps (Frequency range FR1)**

| **Condition** NOTE1,2 | **$T_{SSB_measurement_period_NR}$** |
|---|---|
| No DRX | Max(200ms, 8 × Max(MGRP, SMTC period)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(8 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle > 320ms | 8 × DRX cycle × $CSSF_{NR,EN-DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

**Table 8.17.4.1.2: Measurement period for NR inter-RAT measurements with gaps (Frequency range FR2)**

| **Condition** NOTE1,2 | **$T_{SSB_measurement_period_NR}$** |
|---|---|
| No DRX | Max(400ms, $M_{meas_period_NR}$ × Max(MGRP, SMTC period)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle ≤ 320ms | Max(400ms, (1.5 × $M_{meas_period_NR}$) × Max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle > 320ms | $M_{meas_period_NR}$ × DRX cycle × $CSSF_{NR,EN-DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50].<br>NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

### 8.17.4.1.3 NR Inter-RAT measurement reporting

#### 8.17.4.1.3.1 Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ and NR SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 9.11.1, 9.11.2 and 9.11.3, respectively.

#### 8.17.4.1.3.2 Event-triggered Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ and NR SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 9.11.1, 9.11.2 and 9.11.3, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.4.1.3.3.

#### 8.17.4.1.3.3 Event-triggered Reporting

Reported NR SS-RSRP, NR SS-RSRQ and NR SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 9.11.1, 9.11.2 and 9.11.3, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_NR_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable NR cell within $T_{identify_NR_with_index}$. Both $T_{identify_inter_without_index}$ and $T_{identify_inter_with_index}$ are defined in clause 8.17.4.1.1. When L3 filtering is used an additional delay can be expected.

If an NR cell which has been detectable at least for the time period $T_{identify_NR_without_index}$ or $T_{identify_NR_with_index}$ defined in clause 8.17.4.1.1 and then triggers the measurement report as per TS 38.331 [38], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_NR}$ defined in clause 8.17.4.1.2 provided the timing to that cell has not changed more than ± 3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used an additional delay can be expected.

### 8.17.4.2 E-UTRAN TDD – NR measurements when configured with E-UTRA-NR Dual connectivity

The requirements in clause 8.17.4.1 also apply for this section.

## 8.17.4A E-UTRA Inter-RAT NR Measurements when CCA is used when Configured with E-UTRA-NR Dual Connectivity Operation

### 8.17.4A.1 E-UTRAN FDD – NR measurements when configured with E-UTRA-NR Dual connectivity

Requirements in this clause apply for the NR capable UE configured with inter-RAT measurement on NR, when NR is in carrier frequencies with CCA. For UE supporting EN-DC operation, the requirements in this clause shall apply when NR PSCell is configured. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-NR measurement requirements defined in section 8.1.2.4.21A shall apply.

In the requirements of clause 8.17.4A, the term SMTC occasion not available at the UE refers to when the SMTC contains SSBs configured by gNB in a cell on a carrier frequency subject to CCA, but *N* candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the corresponding period, where:

- For the cell detection procedure: *N* is at least one candidate SSB position (NOTE: the one candidate SSB position for the cell detection shall not be impacted by the set of candidate SSB positions which are already being measured by the UE within the current measurement period of the on-going measurements), and
- For other procedures in clause 8.17.4A: *N* are the first two successive candidate SSB positions when two or more candidate SSB positions are configured for this SSB index in one discovery burst transmission window, otherwise N is one candidate SSB position;

otherwise the SMTC occasion is considered as available at the UE.

The UE shall be able to identify new inter-RAT NR cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-RAT NR cells if carrier frequency information is provided by the PCell, even if no explicit neighbour list with physical layer cell identities is provided.

An NR cell is considered detectable when:

- NR SS-RSRP related conditions in the accuracy requirements in clause 10.1.37.1 of TS 38.133 [50] are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.10 of TS 38.133 [50],
- NR SS-RSRQ related conditions in the accuracy requirements in clause 10.1.30.1 of TS 38.133 [50] are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.10of TS 38.133 [50],
- NR SS-SINR related conditions in the accuracy requirements in clause 10.1.32.1 of TS 38.133 [50] are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.10of TS 38.133 [50].

The NR SS-RSRP measurement accuracy for all measured NR cells shall be as specified in clause 10.1.37.1 of TS 38.133 [50], the NR SS-RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.1.30.1 of TS 38.133 [50], and NR SS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.1.32.1 of TS 38.133 [50] .

### 8.17.4A.1.1 NR Inter-RAT cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter-RAT NR cell within $T_{identify_NR_cca_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured). Otherwise UE shall be able to identify a new detectable inter-RAT NR cell within $T_{identify_NR_cca_with_index}$. The UE shall be able to identify a new detectable inter-RAT NR SSB of an already detected cell within $T_{identify_NR_cca_without_index}$.

$$T_{identify_NR_cca_without_index} = (T_{PSS/SSS_sync_NR_cca} + T_{SSB_measurement_period_NR_cca})\ ms$$

$$T_{identify_NR_cca_with_index} = (T_{PSS/SSS_sync_NR_cca} + T_{SSB_measurement_period_NR_cca} + T_{SSB_time_index_NR_cca})\ ms$$

Where:

$T_{PSS/SSS_sync_NR_cca}$: it is the time period used in PSS/SSS detection given in table 8.17.4A.1.1 -1

$T_{SSB_time_index_NR_cca}$: it is the time period used to acquire the index of the SSB being measured given in table 8.17.4A.1.1-2

$T_{SSB_measurement_period_NR_cca}$: equal to a measurement period of SSB based measurement given in table 8.17.4A.1.2-1

$CSSF_{NR,EN\text{-}DC}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ defined in clause 9.1.5.2.1 of TS 38.133 [50] for measurement conducted within measurement gaps in EN-DC mode.

**Table 8.17.4A.1.1-1: Time period for PSS/SSS detection**

| Condition NOTE1,2,3,4 | $T_{PSS/SSS_sync_NR_cca}$ |
|---|---|
| No DRX | $\max(600ms, (8 + L_{PSS/SSS,gaps}) \times \max(MGRP, SMTC\ period)) \times CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle ≤ 320ms | $\max(600ms, ceil((8+L_{PSS/SSS,gaps}) \times 1.5) \times \max(MGRP, SMTC\ period, DRX\ cycle)) \times CSSF_{NR,EN\text{-}DC}$ |
| DRX cycle > 320ms | $(8 + L_{PSS/SSS,gaps}) \times DRX\ cycle \times CSSF_{NR,EN\text{-}DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50] | |
| NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |
| NOTE 3: $L_{PSS/SSS,gaps}$ is the number of SMTC occasion not available at the UE during $T_{PSS/SSS_sync_NR_cca}$, where $L_{PSS/SSS,gaps} \le L_{PSS/SSS,gaps,max.}$ When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. | |
| NOTE 4: $L_{PSS/SSS,gaps} = 12$ for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms $L_{PSS/SSS,gaps} = 8$ for 40 ms < max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{PSS/SSS,gaps} = 5$ for DRX cycle > 320 ms. | |

Upon exceeding $L_{PSS/SSS,gaps,max}$, the UE is not required to meet the corresponding PSS/SSS detection requirement. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

**Table 8.17.4A.1.1-2: Time period for time index detection**

| Condition NOTE1,2,3,4 | $T_{SSB_time_index_NR_cca}$ |
|---|---|
| No DRX | Max(120ms, (3 + $L_{ind,gaps}$) × max(MGRP, SMTC period)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle ≤ 320ms | Max(120ms, ceil((3 + $L_{ind,gaps}$) × 1.5) × max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle > 320ms | (3 + $L_{ind,gaps}$) × DRX cycle × $CSSF_{NR,EN-DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50] | |
| NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |
| NOTE 3: $L_{ind,gaps}$ is the number of SMTC occasions not available at the UE during $T_{SSB_time_index_NR_cca}$, where $L_{ind,gaps} \le L_{ind,gaps,max}$. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. | |
| NOTE 4: $L_{ind,gaps,max}$ = 5 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, $L_{ind,gaps,max}$ = 3 for max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{ind,gaps,max}$ = 2 for DRX cycle > 320 ms. | |

The UE shall restart the time index detection upon exceeding $L_{ind,gaps,max}$. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

### 8.17.4A.1.2 NR Inter-RAT measurement

When measurement gaps are provided for inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.37.1 of TS 38.133[50], 10.1.30.1 of TS 38.133[50] and 10.1.32.1 of TS 38.133[50], respectively, with a measurement period given by:

**Table 8.17.4A.1.2-1: Measurement period for NR inter-RAT measurements with gaps**

| Condition NOTE1,2,3,4 | $T_{SSB_measurement_period_NR_cca}$ |
|---|---|
| No DRX | Max(200ms, (8+ $L_{meas}$) × max(MGRP, SMTC period)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle ≤ 320ms | Max(200ms, ceil((8+ $L_{meas}$) x 1.5) × max(MGRP, SMTC period, DRX cycle)) × $CSSF_{NR,EN-DC}$ |
| DRX cycle > 320ms | (8+ $L_{meas}$) × DRX cycle × $CSSF_{NR,EN-DC}$ |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50] | |
| NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 of TS 38.133 [50] are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |
| NOTE 3: $L_{meas}$ is the number of SMTC occasion not available at the UE during $T_{SSB_measurement_period_NR_cca}$, where $L_{meas} \le L_{meas,max}$. When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle. When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP. | |
| NOTE 4: $L_{meas,max}$ = 12 for max(DRX cycle, SMTC period, MGRP) ≤ 40 ms, $L_{meas,max}$ = 8 for max(DRX cycle, SMTC period, MGRP) ≤ 320 ms, and $L_{meas,max}$ = 5 for DRX cycle > 320 ms. | |

The UE shall restart the measurement upon exceeding $L_{meas,max}$. The requirements apply provided that any two closest SMTC occasions available at the UE for the measurement shall be separated by no more than the maximum time requirement for the cell to remain known.

When the time period of unsuccessful measurement attemps due to exceeding the maximum number of unavailable at the UE SMTC occasions of an already identified cell exceeds the maximum time requirement for the cell to remain known defined in clause 9.3A.6.3, the UE shall stop the measurement attempts on this SSB and perform the detection procedure again, like for any other SSB.

When SCG DRX is in use the applicable DRX cycle is the SCG DRX cycle.

### 8.17.4A.1.3 NR Inter-RAT measurement reporting

#### 8.17.4.1.3.1 Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.37.1 of TS 38.133[50], 10.1.30.1 of TS 38.133[50] and 10.1.32.1 of TS 38.133[50], respectively.

#### 8.17.4A.1.3.2 Event-triggered Periodic Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 10.1.37.1 of TS 38.133[50], 10.1.30.1 of TS 38.133[50] and 10.1.32.1 of TS 38.133[50], respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.4A.1.3.3.

#### 8.17.4A.1.3.3 Event-triggered Reporting

Reported NR SS-RSRP, NR SS-RSRQ, and NR SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.37.1 of TS 38.133[50], 10.1.30.1 of TS 38.133[50] and 10.1.32.1 of TS 38.133[50], respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x $TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report and all delays due to UL CCA failures until the successful transmission of the report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_NR_cca_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable NR cell within $T_{identify_NR_cca_with_index}$. Both $T_{identify_NR_cca_without_index}$ and $T_{identify_NR_cca_with_index}$ are defined in clause 8.17.4A.1.1. When L3 filtering is used an additional delay can be expected.

If an NR cell which has been detectable at least for the time period $T_{identify_NR_cca_without_index}$ or $T_{identify_NR_cca_with_index}$ defined in clause 8.17.4A.1.1 and then triggers the measurement report as per TS 38.331 [38], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_NR_cca}$ defined in clause 8.17.4A.1.2 provided the timing to that cell has not changed more than ± 3200 Tc while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used an additional delay can be expected.

### 8.17.4A.1.4 NR inter-RAT RSSI measurements

The UE physical layer shall be capable of performing the RSSI measurements, defined in TS 38.215 [58], on one or more inter-RAT carriers operating with CCA, TS 37.213 [57], if the carrier(s) are indicated by higher layers [38], and reporting the RSSI measurements to higher layers. The UE physical layer shall provide to higher layers a single RSSI sample for each OFDM symbol within each configured RSSI measurement duration [38] occurring with a configured RSSI measurement timing configuration periodicity, *rmtc-Periodicity*, according to [38].

**Table 8.17.4A.1.4-1: Measurement period for inter-RAT RSSI measurements with gaps**

| Condition NOTE1,2,3,4 | $T_{RSSI_measurement_period_NR_cca}$ |
|---|---|
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x $CSSF_{NR,EN-DC}$) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x $CSSF_{NR,EN-DC}$) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

If the UE requires measurement gaps to perform inter-RAT measurements, a single measurement gap pattern is used for all concurrent inter-frequency and inter-RAT measurements, including inter-RAT RSSI measurements. The RSSI measurement duration and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

When the inter-RAT RSSI measurement object configured by E-UTRA PCell is on an NR serving frequency carrier and RSSI measurement bandwidth is fully within the active DL BWP of the UE, then the NR intra-frequency RSSI measurements requirements without measurement gap defined in clause 9.2A.7.1 of TS 38.133 [50] shall apply.

The RSSI measurement performed and reported according to this section shall meet the RSSI measurement accuracy requirement in Section 10.1.34.1 of TS 38.133 [50].

### 8.17.4A.1.5 NR inter-RAT channel occupancy measurements

The UE shall be capable of estimating the channel occupancy on one or more carrier frequencies indicated by higher layers [2], based on RSSI samples provided by the physical layer.

**8.17.4A.1.5-1: Measurement period for inter-RAT Channel Occupancy measurements with gaps**

| Condition NOTE1,2,3,4 | $T_{CO_measurement_period_NR_cca}$ |
|---|---|
| No DRX | max(*reportInterval*, max(*rmtc-Periodicity, MGRP*) x $CSSF_{NR,EN-DC}$) |
| DRX | max(*reportInterval*, max(*rmtc-Periodicity*, MGRP,DRX cycle) x $CSSF_{NR,EN-DC}$) |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 of TS 38.133 [50]. | |

If the UE requires measurement gaps to perform inter-RAT measurements, a single measurement gap pattern is used for all concurrent inter-frequency and inter-RAT measurements, including inter-RAT channel occupancy measurements. The RSSI measurement duration used for channel occupancy measurement and the measurement gap should be aligned, and the following additional condition should be fulfilled:

- Entire RSSI measurement duration should be contained in the measurement gap.

When the inter-RAT channel occupancy measurement object configured by E-UTRA PCell is on an NR serving frequency carrier and RSSI measurement bandwidth is fully within the active DL BWP of the UE, then the NR intra-frequency channel occupancy measurements requirements without measurement gap defined in clause 9.2A.7.2 of TS 38.133 [50] shall apply.

The channel occupancy measurement performed and reported according to this section shall meet the channel occupancy measurement accuracy requirements in Section 10.1.35.2 of TS 38.133 [50].

## 8.17.4A.2 E-UTRAN TDD – NR measurements when configured with E-UTRA-NR Dual connectivity

The requirements in clause 8.17.4A.1 also apply for this section.

## 8.17.5 E-UTRAN FDD – UTRAN FDD measurements when Configured with E-UTRA-NR Dual Connectivity

### 8.17.5.1 Introduction

The requirements in this clause apply only to UE supporting E-UTRAN FDD and UTRA FDD. The E-UTRAN FDD - UTRAN FDD measurement requirements defined in section 8.17.5 shall apply when the UE capable of E-UTRA-NR dual connectivity is operating in E-UTRA-NR dual connectivity mode. The requiremenents in section 8.17.5 are applicable for gap pattern id # 0 and #1 as specified in Table 8.1.2.1-1.

The scaling factor $CSSF_{UTRA,\ NSA}$ used in the UTRA FDD measurement requirements in section 8.17.5 for the UE configured with E-UTRA-NR dual connectivity mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-UTRAN FDD measurement requirements defined in section 8.1.2.4.1 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

### 8.17.5.2 E-UTRAN FDD – UTRAN FDD measurements when no DRX is used

#### 8.17.5.2.1 Identification of a new UTRA FDD cell

When explicit neighbour list is provided and no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA} \quad ms$$

A cell shall be considered detectable when

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

#### 8.17.5.2.2 Enhanced UTRA FDD cell identification requirements

When explicit neighbour list is provided and no DRX is used or when DRX cycle length $\leq$ 40 ms, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within $T_{identify,\ enhanced_UTRA_FDD}$:

$$T_{identify,enhanced_UTRA_FDD} = (T_{basic_identify_enhanced_UTRA_FDD} \cdot \frac{480}{T_{inter1}} + 480) \cdot CSSF_{UTRA,NSA} \quad ms$$

A cell shall be considered detectable when:

- CPICH Ec/Io $\geq$ -15 dB,
- SCH_Ec/Io $\geq$ -15 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

#### 8.17.5.2.3 UE UTRA FDD CPICH measurement capability

When measurement gaps are scheduled for UTRA FDD inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in Clause 9.2 with measurement period given by:

$$T_{measurement_UTRA_FDD} = Max\left\{T_{Measurement_Period\ UTRA_FDD}, T_{basic_measurement_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA}\right\} \quad ms$$

The UE shall be capable of performing UTRA FDD CPICH measurements for $X_{basic\ measurementUTRA_FDD}$ inter-frequency cells per FDD frequency and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_UTRA_FDD}$.

$X_{basic\ measurement\ UTRA_FDD} = 6$

$T_{Measurement_Period\ UTRA_FDD}$ = 480 ms. The period used for calculating the measurement period $T_{measurement_UTRA_FDD}$ for UTRA FDD CPICH measurements.

$T_{basic_identify_UTRA_FDD}$ = 300 ms. This is the time period used in the inter RAT equation in clause 8.17.5.2.1 where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

$T_{basic_identify_enhanced_UTRA_FDD}$ = 60 ms. This is the time period used in the inter RAT equation in clause 8.17.5.2.2 where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

$T_{basic_measurement_UTRA_FDD}$ = 50 ms. This is the time period used in the equation for defining the measurement period for inter RAT CPICH measurements.

### 8.17.5.2.4 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

### 8.17.5.2.5 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,\ UTRA_FDD}$ defined in Clause 8.17.5.2.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_FDD}$ defined in Clause 8.17.5.2.2 for the enhanced requirements When L3 filtering is used or IDC autonomous denial or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_FDD}$ defined in clause 8.17.5.2.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_FDD}$ defined in Clause 8.17.5.2.2 for the enhanced requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_FDD}$ defined in clause 8.17.5.2.3 provided the timing to that cell has not changed more than ± 32 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.5.2.6 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.5.2.5.

### 8.17.5.3 E-UTRAN FDD – UTRAN FDD measurements when DRX is used

When explicit neighbour list is provided and DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the neighbour cell list within $T_{identify,UTRA_FDD}$. When DRX is used, $T_{identify,UTRA_FDD}$ is as defined in table 8.17.5.3-1, and when eDRX_CONN is used, $T_{identify,UTRA_FDD}$ is as defined in table 8.17.5.3-2. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.5.3-1: Requirement to identify a newly detectable UTRA FDD cell**

| DRX cycle length (s) | $T_{identify_UTRA_FDD}$ (s) (DRX cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| ≤0.04 | Non DRX Requirements in clause 8.17.5.2 are applicable | Non DRX Requirements in clause 8.17.5.2 are applicable |
| 0.064 | 2.56*$CSSF_{UTRA,NSA}$ (40*$CSSF_{UTRA,NSA}$) | 4.8*$CSSF_{UTRA,NSA}$ (75*$CSSF_{UTRA,NSA}$) |
| 0.08 | 3.2*$CSSF_{UTRA,NSA}$ (40*$CSSF_{UTRA,NSA}$) | 4.8*$CSSF_{UTRA,NSA}$ (60*$CSSF_{UTRA,NSA}$) |
| 0.128 | 3.2*$CSSF_{UTRA,NSA}$ (25*$CSSF_{UTRA,NSA}$) | 4.8*$CSSF_{UTRA,NSA}$ (37.5*$CSSF_{UTRA,NSA}$) |
| 0.16 | 3.2*$CSSF_{UTRA,NSA}$ (20*$CSSF_{UTRA,NSA}$) | 4.8*$CSSF_{UTRA,NSA}$ (30*$CSSF_{UTRA,NSA}$) |
| 0.16<DRX-cycle≤2.56 | Note (20*$CSSF_{UTRA,NSA}$) | Note (20*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.5.3-2: Requirement to identify a newly detectable UTRA FDD cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_UTRA_FDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| 2.56<eDRX_CONN cycle≤10.24 | Note (20*$CSSF_{UTRA,NSA}$) | Note (20*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered detectable provided following conditions are fulfilled: A cell shall be considered detectable when

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

When DRX or eDRX_CONN is used, the UE shall be capable of performing RSCP and Ec/Io measurements of at least 6 UTRA cells per UTRA FDD carrier for up to 3 UTRA FDD carriers and the UE physical layer shall be capable of reporting RSCP and Ec/Io measurements to higher layers within the measurement period $T_{measure_UTRA_FDD}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. UE supporting Increased UE carrier monitoring UTRA shall be capable of performing RSCP and Ec/Io measurements of at least 6 UTRA cells per UTRA FDD carrier for up to 6 UTRA FDD carriers with maximum of 80 cells consisting of at most 32 cells per frequency layer in the neighbour cell list. When DRX is used, $T_{measure_UTRA_FDD}$ is defined in Table 8.1.2.3.1.2-3, and when eDRX_CONN cycle is used, $T_{measure_UTRA_FDD}$ is defined in Table 8.1.2.3.1.2-4. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.5.3-3: Requirement to measure UTRA FDD cells**

| DRX cycle length (s) | $T_{measure_UTRA_FDD}$ (s) (DRX cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| ≤0.04 | Non DRX Requirements in clause 8.17.5.2 are applicable | Non DRX Requirements in clause 8.17.5.2 are applicable |
| 0.064 | 0.48*$CSSF_{UTRA,NSA}$ (7.5*$CSSF_{UTRA,NSA}$ | 0.8*$CSSF_{UTRA,NSA}$ (12.5*$CSSF_{UTRA,NSA}$) |
| 0.08 | 0.48*$CSSF_{UTRA,NSA}$ (6*$CSSF_{UTRA,NSA}$) | 0. 8*$CSSF_{UTRA,NSA}$ (10*$CSSF_{UTRA,NSA}$) |
| 0.128 | 0.64*$CSSF_{UTRA,NSA}$ (5*$CSSF_{UTRA,NSA}$) | 0. 8*$CSSF_{UTRA,NSA}$ (6.25*$CSSF_{UTRA,NSA}$) |

| | | |
|---|---|---|
| 0.128<DRX-cycle≤2.56 | Note (5*$CSSF_{UTRA,NSA}$) | Note (5*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.5.3-4: Requirement to measure UTRA FDD cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_UTRA_FDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | **Gap ID # 0** | **Gap ID # 1** |
| 2.56<eDRX_CONN cycle≤10.24 | Note (5*$CSSF_{UTRA,NSA}$) | Note (5*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.

### 8.17.5.3.1 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

### 8.17.5.3.2 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,UTRA_FDD}$ defined in Clause 8.17.5.3. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_FDD}$ defined in clause 8.17.5.3 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_FDD}$ defined in clause 8.17.5.3 provided the timing to that cell has not changed more than ± 32 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.5.3.3 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.5.3.2.

## 8.17.6 E-UTRAN TDD – UTRAN FDD measurements when Configured with E-UTRA-NR Dual Connectivity

The requirements in clause 8.17.5 also apply for this section when the UE is operating in E-UTRA-NR dual connectivity mode. Otherwise when the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-UTRAN FDD measurement requirements defined in section 8.1.2.4.2 shall apply. The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

## 8.17.7 E-UTRAN FDD – UTRAN FDD measurements for SON when Configured with E-UTRA-NR Dual Connectivity

### 8.17.7.1 Introduction

The requirements in this clause apply only to UE supporting E-UTRAN FDD and UTRA FDD. The E-UTRAN FDD - UTRAN FDD measurement requirements for SON defined in section 8.17.7 shall apply when the UE capable of E-UTRA-NR dual connectivity is operating in E-UTRA-NR dual connectivity mode. The requiremenents in section 8.17.7 are applicable for gap pattern id # 0 and #1 as specified in Table 8.1.2.1-1.

The scaling factor $CSSF_{UTRA, NSA}$ used in the UTRA FDD measurement requirements for SON in section 8.17.7 for the UE configured with E-UTRA-NR dual connectivity mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-UTRAN FDD measurement requirements defined in section 8.1.2.4.7 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

### 8.17.7.2 Identification of a new UTRA FDD cell for SON

No explicit neighbour list is provided to the UE for identifying a UTRA cell for SON. The UE shall identify and report only the strongest cell when requested by the network for the purpose of SON.

#### 8.17.7.2.1 Requirements when no DRX is used

When no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within:

$$T_{identify,\ UTRA_FDD} = T_{basic_identify_UTRA_FDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA} \quad ms$$

$T_{basic_identify_UTRA_FDD}$ = 300 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new UTRA FDD cell is defined.

A cell shall be considered identifiable following conditions are fulfilled:

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA cell for SON within $8*T_{identify,\ UTRA_FDD}$ ms, the UE may stop searching UTRA cells for SON.

#### 8.17.7.2.2 Requirements when DRX is used

When DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within $T_{identify,\ UTRA_FDD}$. When DRX is used, $T_{identify,\ UTRA_FDD}$ is as defined in table 8.17.7.2.2-1, and when eDRX_CONN is used, $T_{identify,\ UTRA_FDD}$ is as defined in table 8.17.7.2.2-2. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.7.2.2-1: Requirement to identify a new UTRA FDD cell for SON**

| DRX cycle length (s) | $T_{identify,\ UTRA_FDD}$ (s) (DRX cycles) | |
|---|---|---|
| | **Gap ID # 0** | **Gap ID # 1** |
| ≤0.04 | Non DRX Requirements in clause 8.17.7.2.1are applicable | Non DRX Requirements in clause 8.17.7.2.1 are applicable |
| 0.04<DRX cycle≤0.08 | Note ($45*CSSF_{UTRA,NSA}$) | Note ($95*CSSF_{UTRA,NSA}$) |
| 0.128 | $3.84*CSSF_{UTRA,NSA}$ ($30*CSSF_{UTRA,NSA}$) | $8.0*CSSF_{UTRA,NSA}$ ($62.5*CSSF_{UTRA,NSA}$) |
| 0.16 | $4.0*CSSF_{UTRA,NSA}$ ($25*CSSF_{UTRA,NSA}$) | $8.0*NCSSF_{UTRA,NSA}$ ($50*CSSF_{UTRA,NSA}$) |
| 0.256 | $6.4*CSSF_{UTRA,NSA}$ ($25*CSSF_{UTRA,NSA}$) | $8.96*CSSF_{UTRA,NSA}$ ($35*CSSF_{UTRA,NSA}$) |

| | | |
|---|---|---|
| 0.32 | 8*CSSF$_{UTRA,NSA}$ (25*CSSF$_{UTRA,NSA}$) | 8.96*CSSF$_{UTRA,NSA}$ (28*CSSF$_{UTRA,NSA}$) |
| 0.32<DRX cycle≤2.56 | Note (25*CSSF$_{UTRA,NSA}$) | Note (25*CSSF$_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.7.2.2-2: Requirement to identify a new UTRA FDD cell for SON when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify,\ UTRA_FDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | **Gap ID # 0** | **Gap ID # 1** |
| 2.56<eDRX_CONN cycle≤10.24 | Note (25*CSSF$_{UTRA,NSA}$) | Note (25* CSSF$_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered identifiable provided following conditions are fulfilled:

- CPICH Ec/Io $\geq$ -20 dB,
- SCH_Ec/Io $\geq$ -17 dB for at least one channel tap and SCH_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code. When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA cell for SON within 8*$T_{identify,\ UTRA_FDD}$ seconds, the UE may stop searching UTRA cells for SON; when DRX is used $T_{identify,\ UTRA_FDD}$ is defined in table 8.17.7.2.2-1, and when eDRX_CONN is used $T_{identify,\ UTRA_FDD}$ is defined in table 8.17.7.2.2-2.

### 8.17.7.2.3 Reporting Delay

The UE shall not report the physical cell identity of an identifiable cell for SON as long as the reporting criteria are not fulfilled.

The reporting delay is defined as the time between the identification of the strongest cell for SON until the UE starts to transmit its physical cell identity over the Uu interface. This requirement assumes that the reporting of the physical cell identity is not delayed by other RRC signalling on the DCCH. This reporting delay excludes a delay uncertainty resulted when inserting the physical cell identity of the strongest cell for SON to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This reporting delay excludes any delay caused by unavailability of UL resources for UE sending the physical cell identity of the strongest cell for SON.

The reporting delay of the physical cell identity of the strongest cell for SON without L3 filtering shall be less than $T_{identify,\ UTRA_FDD}$ defined in clause 8.17.7.2.1 and in clause 8.17.7.2.2 for non DRX and DRX or eDRX_CONN cases respectively. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

## 8.17.8 E-UTRAN TDD – UTRAN FDD measurements for SON when Configured with E-UTRA-NR Dual Connectivity

The requirements in clause 8.17.7 also apply for this section when the UE is operating in E-UTRA-NR dual connectivity mode. Otherwise when the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN TDD-UTRAN FDD measurement requirements for SON defined in section 8.1.2.4.8 shall apply.

## 8.17.9 E-UTRAN TDD – UTRAN TDD measurements when Configured with E-UTRA-NR Dual Connectivity

### 8.17.9.1 Introduction

The requirements in this clause apply only to UE supporting E-UTRAN TDD and UTRA FDD. The E-UTRAN TDD - UTRAN TDD measurement requirements defined in section 8.17.9 shall apply when the UE capable of E-UTRA-NR

dual connectivity is operating in E-UTRA-NR dual connectivity mode. The requiremenents in section 8.17.9 are applicable for gap pattern id # 0 and #1 as specified in Table 8.1.2.1-1.

The scaling factor $CSSF_{UTRA, NSA}$ used in the UTRA TDD measurement requirements in section 8.17.9 for the UE configured with E-UTRA-NR dual connectivity mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN TDD-UTRAN TDD measurement requirements defined in section 8.1.2.4.3 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

## 8.17.9.2 E-UTRAN FDD – UTRAN TDD measurements when no DRX is used

### 8.17.9.2.1 Identification of a new UTRA FDD cell

When explicit neighbour list is provided and no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{identify,\ UTRA_TDD} = Max\left\{5000, T_{basic\ identify\ UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA}\right\} ms$$

A cell shall be considered detectable when

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

### 8.17.9.2.2 Enhanced UTRA TDD cell identification requirements

When explicit neighbour list is provided and no DRX is used or when DRX cycle length $\leq$ 40 ms, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the monitored set within $T_{identify,\ enhanced_UTRA_TDD}$:

$$T_{identify,\ enhanced_UTRA_TDD} = (T_{basic_identify_enhanced_UTRA_TDD} \cdot \frac{480}{T_{inter1}} + 480) \cdot CSSF_{UTRA,NSA} \quad ms$$

A cell shall be considered detectable when:

- P-CCPCH_Ec/Io $\geq$ -6 dB,
- DwPCH_Ec/Io $\geq$ -1 dB

When L3 filtering is used an additional delay can be expected.

### 8.17.9.2.3 UE UTRA TDD P-CCPCH RSCP measurement capability

When measurement gaps are scheduled for UTRA TDD inter RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in Clause 9.3 with measurement period given by

$$T_{measurement\ UTRA_TDD} = Max\left\{T_{Measurement_Period\ UTRA_TDD}, T_{basic\ measurement\ UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA}\right\} ms$$

The UE shall be capable of performing UTRA TDD P-CCPCH RSCP measurements for $X_{basic\ measurementUTRA_TDD}$ inter-frequency cells per TDD frequency of the monitored set, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of $T_{Measurement_\ UTRA_TDD.}$

$X_{basic\ measurementUTRA_TDD} = 6$

$T_{Measurement_Period\ UTRA_TDD}$ = 480 ms is the period used for calculating the measurement period $T_{measurement_UTRA_TDD}$ for UTRA TDD P-CCPCH RSCP measurements.

$T_{basic_identify_UTRA_TDD}$ = 800 ms is the time period used in the inter RAT equation in clause 8.17.9.2.1where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

$T_{basic_identify_enhanced_UTRA_TDD}$ = 80 ms is the time period used in the inter RAT equation in clause 8.17.9.2.2 where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

$T_{basic_measurement_UTRA_TDD}$ = 50 ms is the time period used in the equation for defining the measurement period for inter RAT P-CCPCH RSCP measurements.

#### 8.17.9.2.4 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.17.9.2.5 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify,\ UTRA_TDD}$ defined in Clause 8.17.9.2.1 for the minimum requirements or $T_{identify,\ enhanced_UTRA_TDD}$ defined in Clause 8.17.9.2.2 for the enhanced requirements. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify,\ UTRA_TDD}$ defined in clause 8.17.9.2.1 for the minimum requirements and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_TDD}$ defined in clause 8.17.9.2.3 provided the timing to that cell has not changed more than ± 10 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

#### 8.17.9.2.6 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.9.2.5.

### 8.17.9.3 E-UTRAN TDD – UTRAN TDD measurements when DRX is used

When explicit neighbour list is provided and DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable cell belonging to the neighbour cell list within $T_{identify,UTRA_TDD}$. When DRX is used, $T_{identify,UTRA_TDD}$ is as defined in table 8.17.9.3-1, and when eDRX_CONN is used, $T_{identify,UTRA_TDD}$ is as defined in table 8.17.9.3-2. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.9.3-1: Requirement to identify a newly detectable UTRA TDD cell**

| DRX cycle length (s) | $T_{identify_UTRA_TDD}$ (s) (DRX cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |

| | | |
|---|---|---|
| ≤0.32 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.32<DRX-cycle≤0.512 | Note (20*$CSSF_{UTRA,NSA}$) | Note (25*$CSSF_{UTRA,NSA}$) |
| 0.512<DRX-cycle≤2.56 | Note (20*$CSSF_{UTRA,NSA}$) | Note (20*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.9.3-2: Requirement to identify a newly detectable UTRA TDD cell when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify_UTRA_TDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| 2.56<eDRX_CONN cycle ≤10.24 | Note (20*$CSSF_{UTRA,NSA}$) | Note (20*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered detectable provided following conditions are fulfilled: A cell shall be considered detectable when

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

When DRX or eDRX_CONN is in use, the UE shall be capable of performing UTRA TDD P-CCPCH RSCP measurements of at least 6 UTRA cells per UTRA TDD carrier for up to 3 UTRA TDD carriers and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period $T_{measure_UTRA_TDD}$, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps. UE supporting Increased UE carrier monitoring UTRA shall be capable of performing UTRA TDD P-CCPCH RSCP measurements of at least 6 UTRA cells per UTRA TDD carrier for up to 7 UTRA TDD carriers with maximum of 80 cells consisting of at most 32 cells per frequency layer in the neighbour cell list. When DRX is used, $T_{measure_UTRA_TDD}$ is as defined in Table 8.17.9.3-3, and when eDRX_CONN is used, $T_{measure_UTRA_TDD}$ is as defined in Table 8.17.9.3-4. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.9.3-3: Requirement to measure UTRA TDD cells**

| DRX cycle length (s) | $T_{measure_UTRA_TDD}$ (s) (DRX cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| ≤0.04 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.064 | 0.48*$CSSF_{UTRA,NSA}$ (7.5*$CSSF_{UTRA,NSA}$) | 0.8*$CSSF_{UTRA,NSA}$ (12.5*$CSSF_{UTRA,NSA}$) |
| 0.08 | 0.48*$CSSF_{UTRA,NSA}$ (6*$CSSF_{UTRA,NSA}$) | 0. 8*$CSSF_{UTRA,NSA}$ (10*$CSSF_{UTRA,NSA}$) |
| 0.128 | 0.64*$CSSF_{UTRA,NSA}$ (5*$CSSF_{UTRA,NSA}$) | 0. 8*$CSSF_{UTRA,NSA}$ (6.25*$CSSF_{UTRA,NSA}$) |
| 0. 128<DRX-cycle≤2.56 | Note (5*$CSSF_{UTRA,NSA}$) | Note (5*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.9.3-4: Requirement to measure UTRA TDD cells when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure_UTRA_TDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | Gap ID # 0 | Gap ID # 1 |
| 2.56<eDRX_CONN cycle≤10.24 | Note (5*$CSSF_{UTRA,NSA}$) | Note (5*$CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.

### 8.17.9.3.1 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

#### 8.17.9.3.2 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than $T_{identify, UTRA_TDD}$ defined in Clause 8.17.9.3. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{identify, UTRA_TDD}$ defined in clause 8.17.9.3 and then triggers the measurement report as per TS 36.331 [2], the event triggered measurement reporting delay shall be less than $T_{measurement_UTRA_TDD}$ defined in clause 8.17.9.3 provided the timing to that cell has not changed more than ± 10 chips while measurement gap has not been available and the L3 filter has not been used. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

#### 8.17.9.3.3 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.9.3.2.

### 8.17.10 E-UTRAN FDD – UTRAN TDD measurements when Configured with E-UTRA-NR Dual Connectivity

The requirements in clause 8.17.9 also apply for this section when the UE is operating in E-UTRA-NR dual connectivity mode. Otherwise when the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-UTRAN TDD measurement requirements defined in section 8.1.2.4.4 shall apply.

### 8.17.11 E-UTRAN TDD – UTRAN TDD measurements for SON when Configured with E-UTRA-NR Dual Connectivity

#### 8.17.11.1 Introduction

The requirements in this clause apply only to UE supporting E-UTRAN TDD and UTRA TDD. The E-UTRAN TDD - UTRAN TDD measurement requirements for SON defined in section 8.17.11 shall apply when the UE capable of E-UTRA-NR dual connectivity is operating in E-UTRA-NR dual connectivity mode. The requiremenents in section 8.17.11 are applicable for gap pattern id # 0 and #1 as specified in Table 8.1.2.1-1.

The scaling factor $CSSF_{UTRA, NSA}$ used in the UTRA TDD measurement requirements for SON in section 8.17.11 for the UE configured with E-UTRA-NR dual connectivity mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN TDD-UTRAN TDD measurement requirements defined in section 8.1.2.4.13 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

## 8.17.11.2 Identification of a new UTRA TDD cell for SON

No explicit neighbour list is provided to the UE for identifying a UTRA cell for SON. The UE shall identify and report only the strongest cell when requested by the network for the purpose of SON.

### 8.17.11.2.1 Requirements when no DRX is used

When no DRX is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within:

$$T_{identify,\ UTRA_TDD} = T_{basic_identify_UTRA_TDD} \cdot \frac{480}{T_{inter1}} \cdot CSSF_{UTRA,NSA} \quad ms$$

$T_{basic_identify_UTRA_TDD}$ = 800 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new UTRA TDD cell is defined.

A cell shall be considered identifiable following conditions are fulfilled:

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA TDD cell for SON within $8*T_{identify,\ UTRA_TDD}$ ms, the UE may stop searching UTRA TDD cells for SON.

### 8.17.11.2.2 Requirements when DRX is used

When DRX or eDRX_CONN is used, either measurement gaps are scheduled or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new cell within $T_{identify,\ UTRA_TDD}$. When DRX is used, $T_{identify,\ UTRA_TDD}$ is as defined in table 8.17.11.2.2-1, and when eDRX_CONN is used, $T_{identify,\ UTRA_TDD}$ is as defined in table 8.17.11.2.2-2. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.11.2.2-1: Requirement to identify a new UTRA TDD cell for SON**

| DRX cycle length (s) | $T_{identify,\ UTRA_TDD}$ (s) (DRX cycles) | |
|---|---|---|
| | **Gap Id # 0** | **Gap Id # 1** |
| ≤0.16 | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable | Non DRX Requirements in clause 8.1.2.4.3.1 are applicable |
| 0.16<DRX cycle≤0.256 | Note ($25*CSSF_{UTRA,NSA}$) | Note ($50*CSSF_{UTRA,NSA}$) |
| 0.256<DRX cycle≤0.32 | Note ($25*CSSF_{UTRA,NSA}$) | Note ($45*CSSF_{UTRA,NSA}$) |
| 0.32<DRX cycle≤2.56 | Note ($25*CSSF_{UTRA,NSA}$) | Note ($25*CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the DRX cycle in use | | |

**Table 8.17.11.2.2-2: Requirement to identify a new UTRA TDD cell for SON when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{identify,\ UTRA_TDD}$ (s) (eDRX_CONN cycles) | |
|---|---|---|
| | **Gap Id # 0** | **Gap Id # 1** |
| 2.56<eDRX_CONN cycle≤10.24 | Note ($25*CSSF_{UTRA,NSA}$) | Note ($25*CSSF_{UTRA,NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | | |

A cell shall be considered identifiable provided following conditions are fulfilled:

- P-CCPCH Ec/Io $\geq$ -8 dB,
- DwPCH_Ec/Io $\geq$ -5 dB.

When L3 filtering is used an additional delay can be expected.

If the UE is unable to identify the UTRA TDD cell for SON within $8*T_{identify, UTRA_TDD}$ seconds, the UE may stop searching UTRA TDD cells for SON; when DRX is used $T_{identify, UTRA_TDD}$ is defined in table 8.17.11.2.2-1, and when eDRX_CONN is used $T_{identify, UTRA_TDD}$ is defined in table 8.17.11.2.2-2.

#### 8.17.11.2.3 Reporting Delay

The UE shall not report the physical cell identity of an identifiable cell for SON as long as the reporting criteria are not fulfilled.

The reporting delay is defined as the time between the identification of the strongest cell for SON until the UE starts to transmit its physical cell identity over the Uu interface. This requirement assumes that the reporting of the physical cell identity is not delayed by other RRC signalling on the DCCH. This reporting delay excludes a delay uncertainty resulted when inserting the physical cell identity of the strongest cell for SON to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. When the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration, the delay uncertainty is twice the subframe or slot or subslot of the uplink DCCH. This reporting delay excludes any delay caused by unavailability of UL resources for UE sending the physical cell identity of the strongest cell for SON.

The reporting delay of the physical cell identity of the strongest cell for SON without L3 filtering shall be less than $T_{identify, UTRA_TDD}$ defined in clause 8.17.11.2.1 and in clause 8.17.11.2.2 for non DRX and DRX and eDRX_CONN cases respectively. When L3 filtering is used or IDC autonomous denial is configured, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.12 E-UTRAN FDD – UTRAN TDD measurements for SON when Configured with E-UTRA-NR Dual Connectivity

The requirements in clause 8.17.11 also apply for this section when the UE is operating in E-UTRA-NR dual connectivity mode. Otherwise when the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-UTRAN FDD measurement requirements for SON defined in section 8.1.2.4.14 shall apply.

### 8.17.13 E-UTRAN FDD – GSM measurements when Configured with E-UTRA-NR Dual Connectivity

#### 8.17.13.1 Introduction

The requirements in this clause apply only to UE supporting E-UTRAN FDD and GSM. The E-UTRAN FDD - GSM measurement requirements defined in section 8.17.13 shall apply when the UE capable of E-UTRA-NR dual connectivity is operating in E-UTRA-NR dual connectivity mode. The requiremenents in section 8.17.13 are applicable for gap pattern id # 0 and #1 as specified in Table 8.1.2.1-1.

The scaling factor $CSSF_{GSM, NSA}$ used in the GSM measurement requirements in section 8.17.13 for the UE configured with E-UTRA-NR dual connectivity mode is determined according to $CSSF_{within_gap,i}$ as specified in clause 9.1.5.2.1 of TS 38.133 [50]. When the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-GSM measurement requirements defined in section 8.1.2.4.5 shall apply.

The requirements in this section shall also apply, when the UE is configured to perform NR SRS carrier based switching and using measurement gaps.

#### 8.17.13.2 E-UTRAN FDD – GSM measurements when no DRX is used

Measurements on GSM cells can be requested with BSIC verified. In RRC_CONNECTED state when a supported measurement gap pattern id # 0 or # 1 according to Table 8.1.2.1-1 is configured by E-UTRAN, or the UE supports capability of conducting such measurements without gaps, the UE shall continuously measure GSM cells, search for new GSM cells given in the monitored set and re-confirm the BSIC for already detected cells.

##### 8.17.13.2.1 GSM carrier RSSI

This measurement shall be based on measurement gaps allocated for GSM carrier RSSI measurement as described in clause 8.1.2.1. A UE supporting GSM measurements shall measure minimum number of 10 GSM carrier RSSI measurement samples ($N_{GSM\ carrier\ RSSI}$) per measurement gap. In RRC_CONNECTED state the measurement period, $T_{Measurement\ Period, GSM}$, for the GSM carrier RSSI measurement is $CSSF_{GSM, NSA}$*480 ms.

The UE shall meet the measurement accuracy requirements stated for RXLEV in TS 45.008 [8], when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

#### 8.17.13.2.2 BSIC verification

Measurements on a GSM cell can be requested with BSIC verified. The UE shall be able to report the GSM cells with BSIC verified for those cells where the verification of BSIC has been successful.

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

- **Initial BSIC identification:** Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the E-UTRAN FDD and GSM cells. The UE shall trigger the initial BSIC identification within the available measurement gap pattern sequence. The requirements for BSIC re-confirmation can be found in clause 8.17.13.2.2.1.

- **BSIC re-confirmation:** Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available measurement gap pattern. The requirements for BSIC re-confirmation can be found in clause 8.17.13.2.2.2.

If the network requests measurements on a GSM cell the UE shall behave as follows:

- The UE shall perform GSM carrier RSSI measurements according to clause 8.17.13.2 when a measurement gap pattern sequence is activated, or the UE supports capability of conducting such measurements without gaps.

The UE shall perform measurement reporting as defined in TS 36.331 [2].

- The UE shall perform BSIC identification. The UE shall use the most recently available GSM carrier RSSI measurement results for arranging GSM cells in signal strength order for performing BSIC identification.

- The UE shall perform BSIC re-confirmation on all the GSM cells that have been successfully identified.

- The UE shall perform all configured event evaluation for event-triggered reporting after the BSIC has been verified for a GSM cell. The UE shall use the most recently available GSM carrier RSSI measurement results in event evaluation and event-triggered reporting.

- Event-triggered and periodic reports shall be triggered according to TS 36.331 [2].

The BSIC of a GSM cell is considered to be “verified” if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification). Once a GSM cell has been identified the BSIC shall be re-confirmed at least once every $8*T_{re\text{-}confirm,GSM}$ seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified". If a measurement gap pattern sequence is deactivated by the network after BSIC has been identified or verified, the UE shall consider the BSIC as non-verified.

$T_{identify,GSM}$ indicates the maximum time allowed for the UE to decode the unknown BSIC of the GSM cell in one GSM BCCH carrier in the initial BSIC identification procedure.

$T_{re\text{-}confirm,GSM}$ indicates the maximum time allowed for the re-confirmation of the BSIC of one GSM cell in the BSIC re-confirmation procedure.

The UE shall be able to decode a BSIC within a measurement gap when the time difference between the middle of the received GSM synchronisation burst at the UE and the middle of the effective measurement gap is within the limits specified in table 8.17.13.2.2-1.

**Table 8.17.13.2.2-1: The gap length and maximum time difference for BSIC verification**

| Gap length [ms] | Maximum time difference [μs] |
|---|---|
| 6 | ± 2350 μs |

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 45.005 [9].

#### 8.17.13.2.2.1 Initial BSIC identification

This measurement shall be based on the measurement gaps used for Initial BSIC identification as described in clause 8.17.13.2.2.

The UE shall continuously attempt to decode the BSIC of SCH on the BCCH carrier of the 8 strongest BCCH carriers of the GSM cells indicated in the Inter-RAT cell info list. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BCCH carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall immediately continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within $T_{identify,GSM}$ ms, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall continue to try to perform BSIC identification of the next GSM BCCH carrier in signal strength order. The GSM BCCH carrier for which the BSIC identification failed shall not be re-considered for BSIC identification until BSIC identification attempts have been made for all the rest of the 8 strongest GSM BCCH carriers in the monitored set with unknown BSIC.

$T_{identify,GSM}$ values are given for a set of reference gap patterns in table 8.17.13.2.2.1-1. The requirements in the table represent the time required to guarantee at least two attempts to decode the BSIC for one GSM BCCH carrier. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $T_{identify,GSM}$ shall be based on the 80ms gap configuration.

**Table 8.17.13.2.2.1-1**

| ceil($CSSF_{GSM, NSA} * K_n - M_{gsm}$) | $T_{identify,gsm}$(ms) | | $T_{reconfirm,gsm}$(ms) | |
|---|---|---|---|---|
| | 40ms gap configuration (ID 0) | 80ms gap configuration (ID 1) | 40ms gap configuration (ID 0) | 80ms gap configuration (ID 1) |
| 0 | 2160 | 5280 | 1920 | 5040 |
| 1 | 5280 | 21760 | 5040 | 17280 |
| 2 | 5280 | 31680 | 5040 | 29280 |
| 3 | 19440 | No requirement | 13320 | No requirement |
| 4 | 31680 | No requirement | 29280 | No requirement |
| 5 | 31680 | No requirement | 29280 | No requirement |

#### 8.17.13.2.2.2 BSIC re-confirmation

The UE shall maintain the timing information of up to 8 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For each measurement gap used for GSM BSIC reconfirmation as described in clause 8.17.13.2.2, the UE shall attempt to decode the BSIC falling within the measurement gap according to table 8.17.13.2.2.1-1. If more than one BSIC can be decoded within the same measurement gap, priority shall be given to the least recently decoded BSIC. If inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, then $T_{re\text{-}confirm,GSM}$ shall be based on the 80ms gap configuration.

If the UE fails to decode the BSIC after two successive attempts or if the UE has not been able to re-confirm the BSIC for a GSM cell within $T_{re\text{-}confirm,GSM}$ seconds, the UE shall abort the BSIC re-confirmation attempts for that GSM cell. The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see clause 8.17.13.2.2.1.

### 8.17.13.2.3 Enhanced BSIC verification

In addition to the BSIC verification requirements in clause 8.17.13.2.2, when the UE receives the GSM cell at levels down to 10 dB + the reference sensitivity level or reference interference levels as specified in TS 45.005 [9] the BSIC

identification requirement in table 8.17.13.2.3-1 applies. The BSIC verification requirements in table 8.17.13.2.3-1 shall apply when no DRX is used or when DRX cycle length ≤ 40 ms.

**Table 8.17.13.2.3-1**

| ceil($CSSF_{GSM}$, $_{NSA}*K_n - M_{gsm}$) | $T_{enhanced_identify,gsm}$(ms) | | $T_{enhanced_reconfirm,gsm}$(ms) | |
|---|---|---|---|---|
| | 40ms gap configuration (ID 0) | 40ms gap configuration when interfrequency RSTD measurement is also configured and the UE requires measurement gaps for performing such measurements | 40ms gap configuration (ID 0) | 40ms gap configuration when interfrequency RSTD measurement is also configured and the UE requires measurement gaps for performing such measurements |
| 0 | 1320 | 2160 | 1080 | 1920 |

### 8.17.13.2.4 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

### 8.17.13.2.5 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH.

The event triggered reporting delay requirement is valid when the UE for each GSM carrier in the monitored set can take the required number of samples during the measurement period $T_{Measurement\ Period,\ GSM}$ (see clause 8.17.13.2).

The event triggered measurement reporting delay for a GSM cell with verified BSIC, measured without L3 filtering shall be less than $2*T_{Measurement\ Period,\ GSM}$, where $T_{Measurement\ Period,\ GSM}$ is defined in clause 8.17.13.2. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.13.2.6 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.13.2.5.

## 8.17.13.3 E-UTRAN FDD – GSM measurements when DRX is used

Measurements on GSM cells can be requested with BSIC verified. In RRC_CONNECTED state when a supported measurement gap pattern id # 0 or # 1 according to Table 8.1.2.1-1 is configured by E-UTRAN, or the UE supports capability of conducting such measurements without gaps, the UE shall continuously measure GSM cells, search for new GSM cells given in the monitored set and re-confirm the BSIC for already detected cells. During DRX or eDRX_CONN periods the UE may use other periods of time outside the specified measurement gap patterns. The UE is not required to make measurements of GSM cells during DRX or eDRX_CONN periods if a measurement gap pattern has not been configured, unless the UE supports capability of conducting such measurements without gaps.

### 8.17.13.3.1 GSM carrier RSSI

This measurement shall be based on measurement gaps allocated for GSM carrier RSSI measurement as described in clause 8.1.2.1. A UE supporting GSM measurements shall measure minimum number of 10 GSM carrier RSSI measurement samples ($N_{GSM\ carrier\ RSSI}$) per DRX or eDRX_CONN cycle. When DRX is used in RRC_CONNECTED state, the measurement period, $T_{Measurement\ Period,\ GSM}$, for the GSM carrier RSSI measurement is shown in table 8.17.13.3.1-1. When eDRX_CONN is used in RRC_CONNECTED state, the measurement period, $T_{Measurement\ Period,\ GSM}$, for the GSM carrier RSSI measurement is shown in table 8.17.13.3.1-2. When MCG DRX is in use the applicable DRX cycle is the MCG DRX cycle.

**Table 8.17.13.3.1-1: GSM measurement period for large DRX**

| DRX cycle length (s) | $T_{measure,GSM}$ (s) (DRX cycles) |
|---|---|
| ≤0.064 | Non DRX Requirements are applicable |
| 0.064<DRX-cycle≤ 0.08 | Note ($6*CSSF_{GSM, NSA}$) |
| 0.08<DRX-cycle≤ 2.56 | Note ($5*CSSF_{GSM, NSA}$) |
| Note: Time depends upon the DRX cycle in use | |

**Table 8.17.13.3.1-2: GSM measurement period for large DRX when eDRX_CONN cycle is used**

| eDRX_CONN cycle length (s) | $T_{measure,GSM}$ (s) (eDRX_CONN cycles) |
|---|---|
| 2.56<eDRX_CONN cycle≤10.24 | Note ($5*CSSF_{GSM, NSA}$) |
| Note: Time depends upon the eDRX_CONN cycle in use | |

The UE shall meet the measurement accuracy requirements stated for RXLEV in TS 45.008 [8], when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

### 8.17.13.3.2 BSIC verification

Measurements on a GSM cell can be requested with BSIC verified. The UE shall be able to report the GSM cells with BSIC verified for those cells where the verification of BSIC has been successful.

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

- **Initial BSIC identification:** Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the E-UTRAN FDD and GSM cells.
- **BSIC re-confirmation:** Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available measurement gap pattern

If the network requests measurements on a GSM cell, the UE shall behave as follows:

- The UE shall perform GSM carrier RSSI measurements according to clause 8.17.13.3.1 when a measurement gap pattern sequence is activated, or the UE supports capability of conducting such measurements without gaps.

The UE shall perform measurement reporting as defined in TS 36.331 [2].

- The UE shall perform BSIC identification. The UE shall use the most recently available GSM carrier RSSI measurement results for arranging GSM cells in signal strength order for performing BSIC identification.
- The UE shall perform BSIC re-confirmation on all the GSM cells that have been successfully identified.
- The UE shall perform all configured event evaluation for event-triggered reporting after the BSIC has been verified for a GSM cell. The UE shall use the most recently available GSM carrier RSSI measurement results in event evaluation and event-triggered reporting.
- Event-triggered and periodic reports shall be triggered according to TS 36.331 [2].

The BSIC of a GSM cell is considered to be “verified” if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification). Once a GSM cell has been identified the BSIC shall be re-confirmed at least once every 30 seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified".

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 45.005 [9].

#### 8.17.13.3.2.1 Initial BSIC identification

This measurement shall be made on GSM cells that are requested with BSIC verified.

For DRX cycle length ≤ 40 ms, the initial GSM BSIC identification requirements corresponding to the non DRX requirements as specified in clause 8.17.13.2.2.1 shall apply.

For DRX cycle length > 40 ms and any eDRX_CONN cycle, the UE shall make at least one attempt every $CSSF_{GSM, NSA}$*30s to decode the BSIC of SCH on the BCCH carrier of the 8 strongest BCCH carriers of the GSM cells indicated in the Inter-RAT cell info list. If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within $CSSF_{GSM, NSA}$*60 s, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BCCH carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

#### 8.17.13.3.2.2 BSIC re-confirmation

The UE shall maintain the timing information of up to 8 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For DRX cycle length ≤ 40 ms, the GSM BSIC re-conformation requirements corresponding to the non DRX requirements as specified in clause 8.17.13.2.2.2 shall apply.

For DRX cycle length > 40 ms and any eDRX_CONN cycle, at least every $CSSF_{GSM, NSA}$*30 seconds, the UE shall attempt to decode the BSIC of each identified GSM cell.If the UE fails to decode the BSIC after two successive attempts or if the UE has not been able to re-confirm the BSIC for a GSM cell within $CSSF_{GSM, NSA}$*60 seconds, the UE shall abort the BSIC re-confirmation attempts for that GSM cell. The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see clause 8.17.13.3.2.1.

### 8.17.13.3.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in clause 9.

### 8.17.13.3.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in clause 9.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH.

The event triggered reporting delay requirement is valid when the UE for each GSM carrier in the monitored set can take the required number of samples during the measurement period $T_{Measurement\ Period,\ GSM}$ (see clause 8.17.13.3.1).

The event triggered measurement reporting delay for a GSM cell with verified BSIC , measured without L3 filtering shall be less than 2*$T_{Measurement\ Period,\ GSM}$, where $T_{Measurement\ Period,\ GSM}$ is defined in clause 8.17.13.3.1. When L3 filtering is used or IDC autonomous denial is configured or the UE is performing reception and/or transmission for ProSe Direct Discovery and/or ProSe Direct Communication, or the UE is configured to perform LTE SRS carrier based switching or NR SRS carrier-based switching in FR1 if the UE is capable of per-FR gap, or NR SRS carrier-based switching in either FR1 or FR2 if the UE is not capable of per-FR gap, an additional delay can be expected.

### 8.17.13.3.5 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in clause 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 8.17.13.3.4.

## 8.17.14 E-UTRAN TDD – GSM measurements when Configured with E-UTRA-NR Dual Connectivity

The requirements in clause 8.17.13 also apply for this section when the UE is operating in E-UTRA-NR dual connectivity mode. Otherwise when the UE is not configured with E-UTRA-NR dual connectivity mode then the E-UTRAN FDD-GSM measurement requirements defined in section 8.1.2.4.6 shall apply.

## 8.17.15 E-UTRAN Inter-Frequency RSTD measurements when configured with E-UTRA-NR Dual Connectivity

All inter-frequency RSTD measurement requirements specified in Sections 8.17.15.1-8.17.15.4 shall apply without DRX as well as for any DRX or eDRX_CONN cycles specified in TS 36.331 [2].

The applicability of the requirements in clause 8.17.15 is same as defined in 8.1.2.6.

### 8.17.15.1 E-UTRAN FDD-FDD Inter-Frequency RSTD measurements when configured with E-UTRA-NR Dual Connectivity

The requirements for inter-frequency RSTD measurements in clause 8.1.2.6.1 shall apply, except that the number of PRS positioning occasions within measurement period of $T_{RSTD\ InterFreqFDD,\ EN\text{-}DC}$ is as specified in Table 8.17.15.1-1:

**Table 8.17.15.1-1: Number of PRS positioning occasions within $T_{RSTD\ InterFreqFDD,\ EN\text{-}DC}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions M | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 × $CSSF_{interFreq}$ | 32 × $CSSF_{interFreq}$ |
| >160 ms | 8 × $CSSF_{interFreq}$ | 16 × $CSSF_{interFreq}$ |
| NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2. | | |
| NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively. | | |

Where:

*M* is the number of PRS positioning occasions as defined in Table 8.17.15.1-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$CSSF_{interFreq}$ is the carrier-specific scaling factor for the inter-frequency RSTD measurements and is determined according to $CSSF_{within_gap,i}$ defined in TS 38.133 [50] clause 9.1.5.2.

#### 8.17.15.1.1 RSTD Measurement Reporting Delay

The requirements in clause 8.1.2.6.1.1 shall apply.

### 8.17.15.2 E-UTRAN TDD-FDD Inter-Frequency RSTD measurements when configured with E-UTRA-NR Dual Connectivity

The requirements for inter-frequency RSTD measurements in clause 8.1.2.6.2 shall apply, except that the number of PRS positioning occasions within measurement period of $T_{RSTD\ InterFreqTDDFDD,\ EN\text{-}DC}$ is as specified in Table 8.17.15.2-1:

**Table 8.17.15.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterFreqTDDFDD,\ EN\text{-}DC}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions M | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 × $CSSF_{interFreq}$ | 32 × $CSSF_{interFreq}$ |
| >160 ms | 8 × $CSSF_{interFreq}$ | 16 × $CSSF_{interFreq}$ |

NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the FDD inter-frequency carrier frequency f2.
NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the FDD inter-frequency carrier frequency f2 respectively.

Where:

*M* is the number of PRS positioning occasions as defined in Table 8.17.15.2-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$CSSF_{interFreq}$ is the carrier-specific scaling factor for the inter-frequency RSTD measurements and is determined according to $CSSF_{within_gap,i}$ defined in TS 38.133 [50] clause 9.1.5.2.

### 8.17.15.2.1 RSTD Measurement Reporting Delay

The requirements in clause 8.17.15.1.1 also apply for this section.

## 8.17.15.3 E-UTRAN TDD-TDD Inter-Frequency RSTD measurements when configured with E-UTRA-NR Dual Connectivity

The requirements for inter-frequency RSTD measurements in clause 8.1.2.6.3 shall apply, except that the number of PRS positioning occasions within measurement period of $T_{RSTD\ InterFreqTDD,\ EN\text{-}DC}$ is as specified in Table 8.17.15.3-1:

**Table 8.17.15.3-1: Number of PRS positioning occasions within $T_{RSTD\ InterFreqTDD,\ EN\text{-}DC}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions M | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 × $CSSF_{interFreq}$ | 32 × $CSSF_{interFreq}$ |
| >160 ms | 8 × $CSSF_{interFreq}$ | 16 × $CSSF_{interFreq}$ |
| NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2.<br>NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving TDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively. | | |

Where:

*M* is the number of PRS positioning occasions as defined in Table 8.17.15.3-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$CSSF_{interFreq}$ is the carrier-specific scaling factor for the inter-frequency RSTD measurements and is determined according to $CSSF_{within_gap,i}$ defined in TS 38.133 [50] clause 9.1.5.2,

### 8.17.15.3.1 RSTD Measurement Reporting Delay

The requirements in clause 8.17.15.1.1 also apply for this section.

## 8.17.15.4 E-UTRAN FDD-TDD Inter-Frequency RSTD measurements when configured with E-UTRA-NR Dual Connectivity

The requirements for inter-frequency RSTD measurements in clause 8.1.2.6.4 shall apply, except that the number of PRS positioning occasions within measurement period of $T_{RSTD\ InterFreqFDDTDD,\ EN\text{-}DC}$ is as specified in Table 8.17.15.4-1:

**Table 8.17.15.4-1: Number of PRS positioning occasions within $T_{RSTD\ InterFreqFDDTDD,\ EN\text{-}DC}$**

| Positioning subframe configuration period $T_{PRS}$ | Number of PRS positioning occasions M | |
|---|---|---|
| | f2 Note1 | f1 and f2 Note2 |
| 160 ms | 16 × $CSSF_{interFreq}$ | 32 × $CSSF_{interFreq}$ |
| >160 ms | 8 × $CSSF_{interFreq}$ | 16 × $CSSF_{interFreq}$ |

NOTE 1: When inter-frequency RSTD measurements are performed over the reference cell and neighbour cells, which belong to the TDD inter-frequency carrier frequency f2.
NOTE 2: When inter-frequency RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the serving FDD carrier frequency f1 and the TDD inter-frequency carrier frequency f2 respectively.

Where:

*M* is the number of PRS positioning occasions as defined in Table 8.17.15.4-1, where a PRS positioning occasion is as defined in clause 8.1.2.5.1,

$CSSF_{interFreq}$ is the carrier-specific scaling factor for the inter-frequency RSTD measurements and is determined according to $CSSF_{within_gap,i}$ defined in TS 38.133 [50] clause 9.1.5.2,

#### 8.17.15.4.1 RSTD Measurement Reporting Delay

The requirements in clause 8.17.15.1.1 also apply for this section.

## 8.17.16 E-UTRAN intra-frequency measurement with autonomous gaps when configured with E-UTRA-NR Dual Connectivity

### 8.17.16.1 Introduction

The requirements for E-UTRAN intra-frequency measurement with autonomous gaps defined in section 8.17.16 shall apply when the UE capable of EN-DC is operating in EN-DC mode, and the UE is configured by PCell to identify CGI of an E-UTRA FDD or E-UTRA TDD cell on an E-UTRA serving frequency carrier.

### 8.17.16.2 E-UTRAN FDD intra frequency measurements with autonomous gaps

The requirements defined in 8.1.2.2.3 shall apply.

### 8.17.16.3 E-UTRAN TDD intra frequency measurements with autonomous gaps

The requirements defined in 8.1.2.2.4 shall apply.

## 8.17.17 E-UTRAN inter-frequency measurement with autonomous gaps when configured with E-UTRA-NR Dual Connectivity

### 8.17.17.1 Introduction

The requirements for E-UTRAN inter-frequency measurement with autonomous gaps defined in section 8.17.17 shall apply when the UE capable of EN-DC is operating in EN-DC mode, and the UE is configured by PCell to identify CGI of an E-UTRA FDD or E-UTRA TDD cell on an E-UTRA non-serving frequency carrier.

### 8.17.17.2 E-UTRAN FDD-FDD inter frequency measurements with autonomous gaps

The requirements defined in 8.1.2.3.5 shall apply.

### 8.17.17.3 E-UTRAN TDD-FDD inter frequency measurements using autonomous gaps

The requirements defined in 8.1.2.3.6 shall apply.

### 8.17.17.4 E-UTRAN TDD-TDD inter frequency measurements with autonomous gaps

The requirements defined in 8.1.2.3.7 shall apply.

### 8.17.17.5 E-UTRAN FDD-TDD inter frequency measurements using autonomous gaps

The requirements defined in 8.1.2.3.8 shall apply.

## 8.17.18 E-UTRA FDD - NR CGI measurements with autonomous gaps

The requirements in clause 8.1.2.4.27 also apply in EN-DC operation with E-UTRA FDD PCell when the UE is configured by the E-UTRA PCell to identify CGI of an NR cell. The UE shall fulfil interruption requirements specified in Clause 7.32.2.15 for E-UTRA serving cells.

## 8.17.19 E-UTRA TDD - NR CGI measurements with autonomous gaps

The requirements in clause 8.1.2.4.28 also apply in EN-DC operation with E-UTRA TDD PCell when the UE is configured by the E-UTRA PCell to identify CGI of an NR cell. The UE shall fulfil interruption requirements specified in Clause 7.32.2.15 for E-UTRA serving cells.

# 8.18 Measurements for non-BL/CE UE

## 8.18.1 Introduction

The non-BL/CE UE applicability of the requirements in subclause 8.18 is defined in Section 3.6. The requirements defined in Section 8.18 do not apply when the UE is of category 1bis.

## 8.18.2 Requirements for non-BL/CE UE with CE Mode B

### 8.18.2.1 E-UTRAN intra frequency measurements

#### 8.18.2.1.1 E-UTRAN FDD intra frequency measurements with autonomous gaps for non-BL/CE with CE Mode B

The requirements defined in this subclause 8.18.2.1.4 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BRare supported in the target cell to be detected.

##### 8.18.2.1.1.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose ‘reportCGI’. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1-BRmessage according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of ‘reportCGI’, regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_non\text{-}BL/CE,\ intra} = T_{basic_identify_CGI_non\text{-}BL/CE,\ intra} \quad ms$$

Where

$T_{basic_identify_CGI_non\text{-}BL/CE,\ intra}$ = 2640 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_\ non\text{-}BL/CE,.intra}$ is applicable when no DRX is used as well as when any of DRX and eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_non\text{-}BL/CE,\ intra}$ $ms$ , over which the UE identifies the new CGI of E-UTRA cell, the PBCH repetition and SIB1-BR repetition level in the target cell shall be as specified in Table 8.18.2.1.1.1-1.

**Table 8.18.2.1.1.1-1: Conditions in target cell during $T_{basic_identify_CGI_ non\text{-}BL/CE, intra}$.**

| Target cell | | | |
|---|---|---|---|
| Ês/Iot [dB] | PBCH repetition | SIB1-BR repetition level | SIB1-BR TBS [bits] |
| ≥ -15 | Configured as specified in TS 36.211 [16] | 16 | 208 |

#### 8.18.2.1.1.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

### 8.18.2.1.2 E-UTRAN intra frequency measurements with autonomous gaps for HD-FDD non-BL/CE with CE Mode B

The requirements in this section are applicable for the UE which supports half duplex FDD operation on one or more supported frequency bands [2].

The requirements defined in this subclause 8.13.3.1.5 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BR are supported in the target cell to be detected.

#### 8.18.2.1.2.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

The CGI requirements defined in clause 8.18.2.1.1.1 also apply for this section.

#### 8.18.2.1.2.2 ECGI Reporting Delay

The ECGI reporting delay defined in clause 8.18.2.1.1.2 also apply for this section

### 8.18.2.1.3 E-UTRAN TDD intra frequency measurements with autonomous gaps for non-BL/CE with CE Mode B

The requirements defined in this subclause 8.18.2.1.3 apply provided the following condition is met:

- Tx diversity or transmission using multiple antennas are supported in the target cell to be detected.
- Repetitions of MIB/SIB1-BR are supported in the target cell to be detected.

#### 8.18.2.1.3.1 Identification of a new CGI of E-UTRA cell with autonomous gaps

No explicit neighbour list is provided to the UE for identifying a new CGI of E-UTRA cell. The UE shall identify and report the CGI when requested by the network for the purpose 'reportCGI'. The UE may make autonomous gaps in downlink reception and uplink transmission for receiving MIB and SIB1-BR messages according to clause 5.5.3.1 of TS 36.331 [2]. Note that a UE is not required to use autonomous gap if si-RequestForHO is set to false. If autonomous gaps are used for measurement with the purpose of 'reportCGI', regardless of whether DRX or eDRX_CONN is used or not, or whether SCell(s) are configured or not, the UE shall be able to identify a new CGI of E-UTRA cell within:

$$T_{identify_CGI_non\text{-}BL/CE, intra} = T_{basic_identify_CGI_non\text{-}BL/CE, intra} \quad ms$$

Where

$T_{basic_identify_CGI_non\text{-}BL/CE, intra}$ = 2640 ms. This is the time period used in the above equation where the maximum allowed time for the UE to identify a new CGI of an E-UTRA cell is defined, provided that the E-UTRA cell has been already identified by the UE.

A cell shall be considered identifiable when the following conditions are fulfilled:

- RSRP related side conditions given in Clause 9.1 are fulfilled for a corresponding Band,
- SCH_RP and SCH Ês/Iot according to Annex B.2.14 for a corresponding Band

The MIB of an E-UTRA cell whose CGI is identified shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to [5].

The requirement for identifying a new CGI of an E-UTRA cell within $T_{basic_identify_CGI_non-BL/CE,\ intra}$ is applicable when no DRX is used as well as when any of the DRX or eDRX_CONN cycles specified in TS 36.331 [2] is used.

Within the time, $T_{identify_CGI_non-BL/CE,\ intra}$ *ms* , over which the UE identifies the new CGI of E-UTRA cell, the PBCH repetition and SIB1-BR repetition level in the target cell shall be as specified Table 8.18.2.1.3.1-1.

**Table 8.18.2.1.3.1-1: Conditions in target cell during $T_{basic_identify_CGI_non-BL/CE,\ intra}$.**

| Target cell | | | |
|---|---|---|---|
| Ês/Iot [dB] | PBCH repetition level | SIB1-BR repetition level | SIB1-BR TBS [bits] |
| ≥ -15 | Configured with repetition, as specified in TS 36.211 [16] | 16 | 208 |

#### 8.18.2.1.3.2 ECGI Reporting Delay

The ECGI reporting delay occurs due to the delay uncertainty when inserting the ECGI measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH. In case DRX is used, the ECGI reporting may be delayed until the next DRX cycle. In case eDRX_CONN is used, the ECGI reporting may be delayed until the next eDRX_CONN cycle. If IDC autonomous denial is configured, an additional delay can be expected.

# 8.19 Measurements for NR – E-UTRA Dual Connectivity

## 8.19.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA PSCell.

Requirements in this clause are applicable to UEs which have been configured with NE-DC. Requirements in this clause are applicable to both E-UTRA FDD and E-UTRA TDD PSCell in combination with an NR PCell.

The application of measurement gap sharing and calculation of carrier specific scaling factor are the same as defined in clause 8.17.1.1 and 8.17.1.2, except that

- The term PCell and PSCell shall be deemed to be swapped, and
- UE is not expected to be configured to identify and measure cells on any of: inter-RAT NR, UTRAN, and GSM carriers.

## 8.19.2 Intra-frequency Measurements

PSCC intra-frequency measurements shall meet all applicable requirements in clause 8.1.2.2. If SCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

SCC intra-frequency measurements shall meet all applicable requirements in clause 8.3.3. If SCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clause 8.1.2.2 shall apply and shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

## 8.19.3 Inter-frequency Measurements

The E-UTRAN inter-frequency measurement requirements defined in section 8.19.3 shall apply when the UE capable of NE-DC is operating in NE-DC mode. The requiremenents in section 8.17.3 are applicable for gap pattern id # 0, 1, 2, 3, 4, 6, 7, 8, 10 as specified in Table 8.1.2.1-1.

The same requirements defined in clause 8.17.3 shall apply, except that

- The term EN-DC shall be deemed to be replaced with NE-DC, and

- The MCG DRX shall be deemed to be replaced with SCG DRX.

### 8.19.4 Void

### 8.19.5 Intra-frequency E-CID Measurements

The requirements in this clause shall apply provided the UE has received ECID-RequestLocationInformation message from LMF via LPP requesting the UE to report E-CID UE Rx-Tx Time Difference Measurements and/or E-CID E-UTRAN intra-frequency RSRP and RSRQ measurements [59].

PSCC intra-frequency E-CID measurements shall meet E-UTRAN E-CID intra-frequency measurements requirements in clauses 8.1.2.7.3 and 8.1.2.7.4. If SCG DRX is in use, then the PCell intra-frequency requirements for when DRX is in use in clauses 8.1.2.7.3 and 8.1.2.7.4 shall apply and shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply. The applicable measurement accuracy requirements are in clause 9.1.

### 8.19.6 Intra-frequency measurements with autonomous gaps

#### 8.19.6.1 Introduction

The requirements for E-UTRAN intra-frequency measurements with autonomous gaps defined in clause 8.19.6 shall apply when the UE is configured with NE-DC operation mode, and the UE is configured by PSCell to identify CGI of an E-UTRA FDD or E-UTRA TDD cell on an E-UTRA serving frequency carrier.

#### 8.19.6.2 E-UTRAN FDD intra frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.2.3 shall apply.

#### 8.19.6.3 E-UTRAN TDD intra frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.2.4 shall apply.

### 8.19.7 Inter-frequency measurements with autonomous gaps

#### 8.19.7.1 Introduction

The requirements for E-UTRAN inter-frequency measurement with autonomous gaps defined in section 8.19.7 shall apply when the UE is configured with NE-DC operation mode, and the UE is configured by PSCell to identify CGI of an E-UTRA FDD or E-UTRA TDD cell on an E-UTRA non-serving frequency carrier.

#### 8.19.7.2 E-UTRAN FDD-FDD inter frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.3.5 shall apply.

#### 8.19.7.3 E-UTRAN TDD-FDD inter frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.3.6 shall apply.

#### 8.19.7.4 E-UTRAN TDD-TDD inter frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.3.7 shall apply.

#### 8.19.7.5 E-UTRAN FDD-TDD inter frequency measurements with autonomous gaps

The requirements defined in clause 8.1.2.3.8 shall apply.

# 9 Measurements performance requirements for UE

One of the key services provided by the physical layer is the measurements used to trigger or perform a multitude of functions. Both the UE and the E-UTRAN are required to perform measurements. The physical layer measurement model and a complete list of measurements are specified in [25] and [22] respectively. The physical layer measurements are described and defined in [4]. In this clause for each measurement the relevant requirements on the measurement period, reporting range, granularity and performance in terms of accuracy are specified.

Since the UE reference sensitivity requirements are different depending on supported band, this is noted in each case with definition of the range Io for each frequency band. Definitions of each frequency bands can be found in [5].

Except for requirements in sections 9.1.2A, 9.1.3A, 9.1.5A and 9.1.6A, the accuracy requirements in this clause are applicable for AWGN radio propagation conditions and assume independent interference (noise) at each receiver antenna port.

# 9.1 E-UTRAN measurements

## 9.1.1 Introduction

The requirements in this clause are applicable for a UE:

- in state RRC_CONNECTED
- performing measurements with appropriate measurement gaps as defined in Clause 8.1.2.1.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in [25].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the higher layer filtering disabled.

In the requirements of Section 9 for the UE capable of CA and the UEs configured with up to six downlink SCell(s), the applicable exceptions for side conditions are specified in Annex B, Sections B.4.2 and B.4.3, respectively.

## 9.1.2 Intra-frequency RSRP Accuracy Requirements

### 9.1.2.1 Absolute RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.2.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.2.1-1: RSRP Intra frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 / dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FDD_A, TDD_A | -121 / N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 / N/A | -70 |
| | | | FDD_C, TDD_C | -120 / N/A | -70 |
| | | | FDD_D | -119.5 / N/A | -70 |
| | | | FDD_E, TDD_E | -119 / N/A | -70 |
| | | | FDD_F | -118.5 / N/A | -70 |
| | | | FDD_G | -118 / N/A | -70 |
| | | | FDD_H | -117.5 / N/A | -70 |
| | | | FDD_N | -114.5 / N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, | N/A | -70 / -50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD_F, FDD_G, FDD_H, FDD_N | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.2.2 Relative Accuracy of RSRP

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency.

The accuracy requirements in Table 9.1.2.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

**Table 9.1.2.2-1: RSRP Intra frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot [Note 2] | E-UTRA operating band groups [Note 5] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 4] | $dBm/BW_{Channel}$ |
| ±2 | ±3 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3 | ±3 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.2.3 Absolute RSRP Accuracy under Time Domain Measurement Resource Restriction

The requirements for absolute accuracy of RSRP in this clause shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRP measurements on this cell is configured by higher layers (TS 36.331 [2]).

The accuracy requirements in Table 9.1.2.3-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled,

$RSRP|_{dBm}$ according to Annex B.3.9 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRP measurement,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

**Table 9.1.2.3-1: RSRP Intra frequency absolute accuracy under time domain measurement resource restriction**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 2 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/ 15kHz Note 1, 3 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4.5 | ±9 | ≥-4 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-4 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in that symbol.
NOTE 2: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRP measurements of this cell. The Io range defined by the minimum and the maximum Io levels applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 3: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

For time domain measurements restriction under colliding CRS with ABS configured in non-MBSFN subframes, requirements in Section 9.1.2.1 apply.

### 9.1.2.4 Relative Accuracy of RSRP under Time Domain Measurement Resource Restriction

The requirements for relative accuracy of RSRP in this clause shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRP measurements for this cell is configured by higher layers (TS 36.331 [2]).

The accuracy requirements in Table 9.1.2.4-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled,

RSRP1,2|$_{dBm}$ according to Annex B.3.10 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRP measurement,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

**Table 9.1.2.4-1: RSRP Intra frequency relative accuracy under time domain measurement resource restriction**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 3 range | | |
| | | | E-UTRA operating band groups Note 6 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/ 15kHz Note 1, 5 | dBm/BW$_{Channel}$ |
| ±2 | ±3 | ≥-2 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3 | ±3 | ≥-4 dB | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in that symbol.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRP measurements of this cell. The Io range defined by the minimum and the maximum Io levels applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 5: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

For time domain measurements restriction under colliding CRS with ABS configured in non-MBSFN subframes, requirements in Section 9.1.2.2 apply.

### 9.1.2.5 Absolute RSRP Accuracy under Time Domain Measurement Resource Restriction with CRS assistance information

The requirements for absolute accuracy of RSRP in this clause shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRP measurements on this cell is configured by higher layers (TS 36.331 [2]) and the CRS assistance information is provided. The requirements apply for UEs supporting CRS interference handling.

The accuracy requirements in Table 9.1.2.5-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Secion 7.3 for reference sensitivity are fulfilled,

$RSRP|_{dBm}$ according to Annex B.3.11 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRP measurement,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern,

The UE is provided with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

**Table 9.1.2.5-1: RSRP Intra frequency absolute accuracy under Time Domain Measurement Resource Restriction with CRS assistance information**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 2 range | | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 1, 3 | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥-9.46 | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-9.46 | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: This Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.<br>NOTE 2: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRP measurements of this cell. The specified Io range applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.<br>NOTE 3: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.2.6 Relative Accuracy of RSRP under Time Domain Measurement Resource Restriction with CRS assistance information

The requirements for relative accuracy of RSRP in this clause shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRP measurements for this cell is configured by higher layers (TS 36.331 [2]) and the CRS assistance information is provided. The requirements apply for UEs supporting CRS interference handling.

The accuracy requirements in Table 9.1.2.6-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Section 7.3 for reference sensitivity are fulfilled,

$RSRP1,2|_{dBm}$ according to Annex B.3.12 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRP measurement,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern,

The UE is provided with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

The requirements in this section shall also be met also when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

**Table 9.1.2.6-1: RSRP Intra frequency relative accuracy under Time Domain Measurement Resource Restriction with CRS assistance information**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** Note 2, 6 | **Io** Note 3 **range** | | |
| | | | **E-UTRA operating band groups** Note 7 | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz** Note 1, 5 | **dBm/BW$_{Channel}$** |
| ±2 | ±3 | ≥-6.96 | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3 | ±3 | ≥-9.46 | Note 4 | Note 4 | Note 4 |

NOTE 1: This Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRP measurements of this cell. The specified Io range applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 5: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: The gap between the Es/Iot level in table 9.1.2.6-1 and 9.1.2.4-1 is due to the interference from either PCell or at least one neighbour cell indicated within the CRS assistance information.
NOTE 7: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.2.7 Absolute RSRP Accuracy for UE Category 1bis

Unless otherwise specified, the requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.2.7-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.2.7-1: RSRP Intra frequency absolute accuracy for UE category 1bis**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | Io Note 1 range | | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±5.5 | ±10 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.2.8 Relative Accuracy of RSRP for UE Category 1bis

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency.

The accuracy requirements in Table 9.1.2.8-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

**Table 9.1.2.8-1: RSRP Intra frequency relative accuracy for UE category 1bis**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.2A Intra-frequency RSRP Accuracy Requirements in High Doppler Conditions

The accuracy requirements in this clause are applicable for EVA300 and EVA600 propagation conditions and assume independent interference (noise) at each receiver antenna port. The accuracy requirements in this clause are also applicable for EVA875 and HST875 propagation conditions when *highSpeedEnhancedMeasFlag* or highSpeedEnhMeasFlagSCell-r16 is configured or for HST-SFN972 propagation conditions when highSpeedEnhMeasFlag2-r16 is configured and assume independent interference (noise) at each receiver antenna port.

### 9.1.2A.1 Absolute RSRP Accuracy in high Doppler conditions

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.2A.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.2A1-1: RSRP Intra frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±10.5 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±9.5 | ±12.5 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.2A.2 Relative Accuracy of RSRP in high Doppler conditions

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency.

The accuracy requirements in Table 9.1.2A.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

**Table 9.1.2A.2-1: RSRP Intra frequency relative accuracy**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** Note 2 | **Io** Note 1 **range** | | |
| | | | **E-UTRA operating band groups** Note 5 | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz** Note 4 | **dBm/BW$_{Channel}$** |
| ±3.3 | ±4.3 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4.3 | ±4.3 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.2B Intra-frequency RSRP Accuracy requirements for CA Idle Mode Measurements

### 9.1.2B.1 Introduction

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of RSRP.

### 9.1.2B.2 Intra-frequency Absolute RSRP Accuracy for CA Idle Mode Measurements

Unless otherwise specified, the requirements for absolute accuracy of RSRP in this clause apply to the Idle mode serving cell.

The accuracy requirements in Table 9.1.2B.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.1 for a corresponding Band

**Table 9.1.2B.2-1: RSRP Intra frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±6 | ±10.5 | ≥-4 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±9.5 | ±12.5 | ≥-4 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.3 Inter-frequency RSRP Accuracy Requirements

### 9.1.3.1 Absolute RSRP Accuracy

The requirements for absolute accuracy of RSRP in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.3.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.3.1-1: RSRP Inter frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±8 | ±11 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.3.2 Relative Accuracy of RSRP

The relative accuracy of RSRP in inter frequency case is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.3.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left|RSRP1\right|_{dBm} - RSRP2\left|_{dBm}\right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.3.2-1: RSRP Inter frequency relative accuracy**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** Note 2 | **Io** Note 1 **range** | | |
| | | | **E-UTRA operating band groups** Note 4 | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz** Note 3 | **dBm/BW$_{Channel}$** |
| ±4.5 | ±6 | ≥-6 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.3.3 Absolute RSRP Accuracy for UE Category 1bis

The requirements for absolute accuracy of RSRP in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.3.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.3.3-1: RSRP Inter frequency absolute accuracy for UE category 1bis**

| **Accuracy** | | **Conditions** | |
|---|---|---|---|
| | | **Ês/Iot** | **Io** Note 1 **range** |

| Normal condition | Extreme condition | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|---|---|---|---|---|---|---|
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±5.5 | ±10 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.3.4 Relative Accuracy of RSRP for UE Category 1bis

The relative accuracy of RSRP in inter frequency case is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.3.4-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left|RSRP1\right|_{dBm} - RSRP2\left|_{dBm}\right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.3.4-1: RSRP Inter frequency relative accuracy for UE category 1bis**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±5.5 | ±7 | ≥-6 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.3A Inter-frequency RSRP Accuracy Requirements in High Doppler Conditions

The accuracy requirements in this clause are applicable for [EVA300 and EVA600] propagation conditions and assume independent interference (noise) at each receiver antenna port.

### 9.1.3A.1 Absolute RSRP Accuracy in high Doppler conditions

The requirements for absolute accuracy of RSRP in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.3A.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.3A.1-1: RSRP Inter frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±10.5 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±9.5 | ±12.5 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.3A.2 Relative Accuracy of RSRP in high Doppler conditions

The relative accuracy of RSRP in inter frequency case is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.3A.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1|_{dBm} - RSRP2|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.3A.2-1: RSRP Inter frequency relative accuracy**

| Accuracy | Conditions |
|---|---|

| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
|---|---|---|---|---|---|
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±5.8 | ±7.3 | ≥-6 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.3B Inter-frequency RSRP Accuracy requirements for CA Idle Mode Measurements

### 9.1.3B.1 Introduction

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of RSRP for overlapping and non-overlapping carriers.

### 9.1.3B.2 Inter-frequency Absolute RSRP Accuracy for Overlapping Carrier

The requirements for absolute accuracy of RSRP of an overlapping carrier when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$, in this clause, apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.3B.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.2 for a corresponding Band

**Table 9.1.3B.2-1: RSRP Inter frequency absolute accuracy for overlapping carrier**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±10.5 | ≥-4 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±9.5 | ±12.5 | ≥-4 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, | N/A | -70 | -50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD_F, FDD_G, FDD_H, FDD_N | | | |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.3B.3 Inter-frequency Absolute RSRP Accuracy for Overlapping and Non-overlapping Carrier

The requirements for absolute accuracy of RSRP of an overlapping carrier when Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, and a non-overlapping carrier in this clause, apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.3B.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.2 for a corresponding Band

**Table 9.1.3B.3-1: RSRP Inter frequency absolute accuracy for overlapping and non-overlapping carrier**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** | **Io [Note 1] range** | | |
| | | | **E-UTRA operating band groups [Note 3]** | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz [Note 2]** / **dBm/BW$_{Channel}$** | **dBm/BW$_{Channel}$** |
| ±7 | ±11.5 | ≥-4 dB | FDD_A, TDD_A | -121 / N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 / N/A | -70 |
| | | | FDD_C, TDD_C | -120 / N/A | -70 |
| | | | FDD_D | -119.5 / N/A | -70 |
| | | | FDD_E, TDD_E | -119 / N/A | -70 |
| | | | FDD_F | -118.5 / N/A | -70 |
| | | | FDD_G | -118 / N/A | -70 |
| | | | FDD_H | -117.5 / N/A | -70 |
| | | | FDD_N | -114.5 / N/A | -70 |
| ±10.5 | ±13.5 | ≥-4 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.4 RSRP Measurement Report Mapping

The reporting range of RSRP is defined from -156 dBm to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 9.1.4-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.4-1: RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RSRP_-17 | RSRP< -156 | dBm |
| RSRP_-16 | -156 ≤ RSRP< -155 | dBm |
| … | … | … |
| RSRP_-03 | -143 ≤ RSRP< -142 | dBm |
| RSRP_-02 | -142 ≤ RSRP< -141 | dBm |

| | | |
|---|---|---|
| RSRP_-01 | -141 ≤ RSRP< -140 | dBm |
| RSRP_00 | RSRP < -140 | dBm |
| RSRP_01 | -140 ≤ RSRP < -139 | dBm |
| RSRP_02 | -139 ≤ RSRP < -138 | dBm |
| … | … | … |
| RSRP_95 | -46 ≤ RSRP < -45 | dBm |
| RSRP_96 | -45 ≤ RSRP < -44 | dBm |
| RSRP_97 | -44 ≤ RSRP | dBm |

## 9.1.5 Intra-frequency RSRQ Accuracy Requirements

### 9.1.5.1 Absolute RSRQ Accuracy

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.5.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.5.1-1: RSRQ Intra frequency absolute accuracy**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** | **Io [Note 1] range** | | |
| | | | **E-UTRA operating band groups [Note 4]** | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz [Note 3]** | **dBm/BW$_{Channel}$** |
| ±2.5 | ±4 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.5.2 Absolute RSRQ Accuracy under Time Domain Measurement Resource Restriction

The requirements for absolute accuracy of RSRQ in this clause shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRQ measurements of this cell is configured by higher layers (TS 36.331 [2]).

The accuracy requirements in Table 9.1.5.2-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled,

RSRP$|_{dBm}$ according to Annex B.3.9 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRQ measurement,

The RSRQ measurement is not performed in any subframe other than those indicated by the time domain measurement resource restriction pattern configured for the measured cell,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

**Table 9.1.5.2-1: RSRQ Intra frequency absolute accuracy under time domain measurement resource restriction**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 2 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/ 15kHz Note 1, 4 | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-2 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-4 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in that symbol.
NOTE 2: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRQ measurements of this cell. The Io range defined by the minimum and the maximum Io levels applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

For time domain measurements restriction under colliding CRS with ABS configured in non-MBSFN subframes, requirements in Section 9.1.5.1 apply.

### 9.1.5.3 Absolute RSRQ Accuracy under Time Domain Measurement Resource Restriction with CRS assistance information

The requirements for absolute accuracy of RSRQ in this section shall apply to a cell on the same frequency as that of the serving cell when a time domain measurement resource restriction pattern for performing RSRQ measurements of this cell is configured by higher layers (TS 36.331 [2]) and the CRS assistance information is provided. The requirements apply for UEs supporting CRS interference handling.

The accuracy requirements in Table 9.1.5.3-1 are valid under the following conditions:

Cell specific reference signals in the measured cell are transmitted either from one, two or four antenna ports,

Conditions defined in 36.101 Section 7.3 for reference sensitivity are fulfilled,

$RSRP|_{dBm}$ according to Annex B.3.11 for a corresponding Band,

The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRQ measurement,

The RSRQ measurement is not performed in any subframe other than those indicated by the time domain measurement resource restriction pattern configured for the measured cell,

Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern,

The UE is provided with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

**Table 9.1.5.3-1: RSRQ Intra frequency absolute accuracy under Time Domain Measurement Resource Restriction with CRS assistance information**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 2 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 5 | E-UTRA operating band groups Note 6 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 1, 4 | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-6.96 | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-9.46 | Note 3 | Note 3 | Note 3 |

NOTE 1: This Io condition is expressed as the average Io per RE over all REs in that symbol.
NOTE 2: Io is defined in subframes indicated by the time domain measurement resource restriction pattern configured for performing RSRQ measurements of this cell. The specified Io range applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: The gap between the Es/Iot level in table 9.1.5.3-1 and 9.1.5.2-1 is due to the interference from either PCell or at least one neighbour cell indicated within the CRS assistance information.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.5.4 Absolute WB-RSRQ Accuracy

The requirements in this section shall apply when the measurement configuration message received by the UE contains *widebandRSRQ-Meas* parameter in TS 36.331 [2]. The WB-RSRQ accuracy figures in Table 9.1.5.4-1are relative to the value that would be obtained by using the *AllowedMeasBandwidth* in TS 36.331 [2].

The accuracy requirements in Table 9.1.5.4-1 are valid under the following conditions:

The value of the parameter, *AllowedMeasBandwidth* in TS 36.331 [2], is 50 resource blocks or larger

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band.

**Table 9.1.5.4-1: WB-RSRQ Intra frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | | Io range Note 1 | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io1-Io2 Note 2 | E-UTRA operating band groups Note 6 | Minimum Io Note 5 | Maximum Io |
| dB | dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-3 dB | 0 ≤Io1-Io2 | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | | Note 4 | Note 4 | Note 4 |

NOTE 1: Io is the average across all the resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2].
NOTE 2: Io1 is the Io level in the resource blocks other than central 6 resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2] and Io2 is the Io level in central 6 resource blocks. The Io1 and Io2 have the same range as defined for Io.
NOTE 3: Iot is the received power spectrum density of total interference and noise for all the resource blocks, other than central 6 resource blocks.
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 5: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.5.5 Absolute RSRQ Accuracy for UE Category 1bis

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.5.5-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.5.5-1: RSRQ Intra frequency absolute accuracy for UE category 1bis**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** | **Io [Note 1] range** | | |
| | | | **E-UTRA operating band groups [Note 4]** | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz [Note 3]** | **dBm/BW$_{Channel}$** |
| ±3.5 | ±5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4.5 | ±5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.5A Intra-frequency RSRQ Accuracy Requirements in High Doppler Conditions

The accuracy requirements in this clause are applicable for EVA300 and EVA600 propagation conditions and assume independent interference (noise) at each receiver antenna port. The accuracy requirements in this clause are also applicable for EVA875 and HST875 propagation conditions when *highSpeedEnhancedMeasFlag* or highSpeedEnhMeasFlagSCell-r16 is configured or for HST-SFN972 propagation conditions when *highSpeedEnhMeasFlag2-r16* is configured and assume independent interference (noise) at each receiver antenna port.

### 9.1.5A.1 Absolute RSRQ Accuracy in high Doppler conditions

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.5A.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.5A.1-1: RSRQ Intra frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/$BW_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.5B Intra-frequency RSRQ Accuracy requirements for CA Idle Mode Measurements

### 9.1.5B.1 Introduction

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of RSRQ.

### 9.1.5B.2 Intra-frequency Absolute RSRQ Accuracy for CA Idle Mode Measurements

Unless otherwise specified, the requirements for absolute accuracy of RSRQ in this clause apply to the Idle mode serving cell.

The accuracy requirements in Table 9.1.5B.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.1 for a corresponding Band

**Table 9.1.5B.2-1: RSRQ Intra frequency absolute accuracy**

| Accuracy | Conditions |
|---|---|

| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | |
|---|---|---|---|---|---|
| | | | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | dBm/BW$_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.6 Inter-frequency RSRQ Accuracy Requirements

### 9.1.6.1 Absolute RSRQ Accuracy

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.6.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.6.1-1: RSRQ Inter frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.6.2 Relative Accuracy of RSRQ

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.6.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left|RSRP1\right|_{dBm} - RSRP2\left|_{dBm}\right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.6.2-1: RSRQ Inter frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 2 | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.6.3 Absolute WB-RSRQ Accuracy

The requirements in this section shall apply when the measurement configuration message received by the UE contains *widebandRSRQ-Meas* parameter in TS 36.331 [2]. The WB-RSRQ accuracy figures in Table 9.1.6.3-1are relative to the value that would be obtained by using the *AllowedMeasBandwidth* in TS 36.331 [2].

The accuracy requirements in Table 9.1.6.3-1 are valid under the following conditions:

The value of the parameter, *AllowedMeasBandwidth* in TS 36.331 [2], is 50 resource blocks or larger

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band.

**Table 9.1.6.3-1: WB-RSRQ Inter frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | | Io range Note 1 | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io1-Io2 Note 2 | E-UTRA operating band groups Note 6 | Minimum Io Note 5 | Maximum Io |
| dB | dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-3 dB | | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 0 ≤Io1-Io2 | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | | Note 4 | Note 4 | Note 4 |

NOTE 1: Io is the average across all the resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2].
NOTE 2: Io1 is the Io level in the resource blocks other than central 6 resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2] and Io2 is the Io level in central 6 resource blocks. The Io1 and Io2 have the same range as defined for Io.
NOTE 3: Iot is the received power spectrum density of total interference and noise for all the resource blocks, other than central 6 resource blocks.
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 5: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.6.4 Relative WB-RSRQ Accuracy

The requirements in this section shall apply when the measurement configuration message received by the UE contains *widebandRSRQ-Meas* parameter in TS 36.331 [2]. The WB-RSRQ accuracy figures in Table 9.1.6.4-1are relative to the value that would be obtained by using the *AllowedMeasBandwidth* in TS 36.331 [2].

The accuracy requirements in Table 9.1.6.4-1 are valid under the following conditions:

The value of the parameter, *AllowedMeasBandwidth* in TS 36.331 [2], is 50 resource blocks or larger for the measured cells from different frequencies

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left|RSRP1\right|_{dBm} - RSRP2\left|_{dBm}\right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.6.4-1: WB-RSRQ Inter frequency relative accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | | Io range Note 1 | | |
| Normal condition | Extreme condition | Ês/Iot Note 3 | Io1-Io2 Note 2 | E-UTRA operating band groups Note 6 | Minimum Io Note 5 | Maximum Io |
| dB | dB | dB | dB | | dBm/15kHz | dBm/$BW_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | 0 ≤Io1-Io2 | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | | Note 4 | Note 4 | Note 4 |

NOTE 1: Io is the average across all the resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2].
NOTE 2: Io1 is the Io level in the resource blocks other than central 6 resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2] and Io2 is the Io level in central 6 resource blocks. The Io1 and Io2 have the same range as defined for Io.
NOTE 3: Iot is the received power spectrum density of total interference and noise for all the resource blocks, other than central 6 resource blocks. The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 5: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.

NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.6.5 Absolute RSRQ Accuracy for UE Category 1bis

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.6.5-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.6.5-1: RSRQ Inter frequency absolute accuracy for UE category 1bis**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | dBm/BW$_{Channel}$ |
| ±3.5 | ±5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4.5 | ±5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.6.6 Relative Accuracy of RSRQ for UE Category 1bis

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.6.6-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1\big|_{dBm} - RSRP2\big|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.6.6-1: RSRQ Inter frequency relative accuracy for UE category 1bis**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot [Note 2] | E-UTRA operating band groups [Note 5] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 4] | dBm/BW$_{Channel}$ |
| | | | FDD_A, TDD_A | -121 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±4 | ±5 | ≥-3 dB | FDD_B1 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±5 | ±5 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.6A Inter-frequency RSRQ Accuracy Requirements in High Doppler Conditions

The accuracy requirements in this clause are applicable for EVA300 and EVA600 propagation conditions and assume independent interference (noise) at each receiver antenna port.

### 9.1.6A.1 Absolute RSRQ Accuracy in high Doppler conditions

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.6A.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.6A.1-1: RSRQ Inter frequency absolute accuracy**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| | | | **Io** [Note 1] **range** | | |
| **Normal condition** | **Extreme condition** | **Ês/Iot** | **E-UTRA operating band groups** [Note 4] | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz** [Note 3] | **dBm/BW$_{Channel}$** |
| ±4 | ±5.5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.6A.2 Relative Accuracy of RSRQ in high Doppler conditions

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.6A.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|dBm according to Annex B.3.4 for a corresponding Band

$$\left|RSRP1\right|_{dBm} - RSRP2\left|_{dBm}\right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.6A.2-1: RSRQ Inter frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 2 | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3.5 | ±5.0 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4.5 | ±5.0 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.6B Inter-frequency absolute RSRQ Accuracy requirements for CA Idle Mode Measurements

### 9.1.6B.1 Introduction

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements are for absolute accuracy of RSRQ for overlapping and non-overlapping carriers.

### 9.1.6B.2 Inter-frequency Absolute RSRQ Accuracy for Overlapping Carrier

The requirements for absolute accuracy of RSRQ for an overlapping carrier when Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$ in this clause, apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.6B.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.2 for a corresponding Band

**Table 9.1.6B.2-1: RSRQ Inter frequency absolute accuracy for overlapping carrier**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | dBm/$BW_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.6B.3 Inter-frequency absolute RSRQ Accuracy for Overlapping and Non-overlapping Carrier

The requirements for absolute accuracy of RSRQ for and overlapping carrier when Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$ and a non-overlapping carrier in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.6B.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.1.2 for a corresponding Band

**Table 9.1.6B.3-1: RSRQ Inter frequency absolute accuracy for overlapping and non-overlapping carrier**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | dBm/$BW_{Channel}$ |
| ±5 | ±6.5 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±6 | ±6.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.7 RSRQ Measurement Report Mapping

The reporting range of RSRQ is defined from -34 dB to 2.5 dB with 0.5 dB resolution.

The mapping of measured quantity is defined in table 9.1.7-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.7-1: RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RSRQ_-30 | RSRQ < -34 | dB |
| RSRQ_-29 | -34 ≤ RSRQ < -33.5 | dB |
| … | … | … |
| RSRQ_-02 | -20.5 ≤ RSRQ < -20 | dB |
| RSRQ_-01 | -20 ≤ RSRQ < -19.5 | dB |
| RSRQ_00 | RSRQ < -19.5 | dB |
| RSRQ_01 | -19.5 ≤ RSRQ < -19 | dB |
| RSRQ_02 | -19 ≤ RSRQ < -18.5 | dB |
| … | … | … |
| RSRQ_32 | -4 ≤ RSRQ < -3.5 | dB |
| RSRQ_33 | -3.5 ≤ RSRQ < -3 | dB |
| RSRQ_34 | -3 ≤ RSRQ | dB |
| RSRQ_35 | -3 ≤ RSRQ < -2.5 | dB |
| RSRQ_36 | -2.5 ≤ RSRQ < -2 | dB |
| … | … | … |
| RSRQ_45 | 2 ≤ RSRQ < 2.5 | dB |
| RSRQ_46 | 2.5 ≤ RSRQ | dB |

Note: The ranges from RSRQ_-30 to RSRQ_-01 and from RSRQ_35 to RSRQ_46 apply for the UE who can support extended RSRQ range in [31].

## 9.1.8 Power Headroom

The requirements in this clause shall apply for power headroom Type 1 and for power headroom Type 2, which are specified in clause 5.1.1.2 in [3].

For a UE not configured with a secondary cell, the power headroom provides the serving eNB with information about the differences between the UE configured maximum output power ($P_{CMAX,}$) defined in TS 36.101 [5] and the estimated power for UL-SCH transmission of the serving cell [3]. In this case the UE shall meet requirements for power headroom Type 1.

For a UE configured with a secondary cell, the power headroom provides the serving eNB with information about the differences between the UE configured maximum output power ($P_{CMAX,c}$) defined in TS 36.101[5] and the estimated power for UL-SCH transmission per activated serving cell c, or the estimated power for simultaneous PUSCH and PUCCH transmission on PCell [3]. In this case the UE shall meet requirements for both power headroom Type 1 and Type 2.

### 9.1.8.1 Period

The reported power headroom shall be estimated over 1 subframe or 1 slot or subslot in use by the UE for the uplink.

When *extendedPHR* is not configured [17], the Type 1 power headroom shall be estimated for the primary serving cell as defined in clause 5.1.1.2 in TS 36.213 [3].

When *extendedPHR* is configured [17], the Type 1 and Type 2 power headroom shall be estimated for each activated serving cell with configured uplink as defined in clause 5.1.1.2 in TS 36.213 [3].

### 9.1.8.2 Reporting Delay

The power headroom reporting delay is defined as the time between the beginning of the power headroom reference period and the time when the UE starts transmitting the power headroom over the radio interface. The reporting delay of the power headroom shall be 0 ms, which is applicable for all configured triggering mechanisms for power headroom reporting.

### 9.1.8.3 Void

### 9.1.8.4 Report Mapping

The power headroom reporting range is from -23 ...+40 dB. Table 9.1.8.4-1 defines the report mapping.

**Table 9.1.8.4-1: Power headroom report mapping**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -23 ≤ PH < -22 |
| POWER_HEADROOM_1 | -22 ≤ PH < -21 |
| POWER_HEADROOM_2 | -21 ≤ PH < -20 |
| POWER_HEADROOM_3 | -20 ≤ PH < -19 |
| POWER_HEADROOM_4 | -19 ≤ PH < -18 |
| POWER_HEADROOM_5 | -18 ≤ PH < -17 |
| … | … |
| POWER_HEADROOM_57 | 34 ≤ PH < 35 |
| POWER_HEADROOM_58 | 35 ≤ PH < 36 |
| POWER_HEADROOM_59 | 36 ≤ PH < 37 |
| POWER_HEADROOM_60 | 37 ≤ PH < 38 |
| POWER_HEADROOM_61 | 38 ≤ PH < 39 |
| POWER_HEADROOM_62 | 39 ≤ PH < 40 |
| POWER_HEADROOM_63 | PH ≥ 40 |

## 9.1.9 UE Rx – Tx time difference

### 9.1.9.1 Measurement Requirement

The UE RX-TX time difference is measured from the PCell.

The accuracy requirements in Table 9.1.9.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

No changes to the uplink transmission timing are applied during the measurement period.

$RSRP|_{dBm}$ according to Annex B.3.5 for a corresponding Band

**Table 9.1.9.1-1: UE Rx – Tx time difference measurement accuracy**

| Accuracy | Conditions | | | | |
|---|---|---|---|---|---|
| | Ês/Iot | Downlink transmission bandwidth of PCell | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 6 | Minimum Io | Maximum Io |
| Ts Note 2 | dB | MHz | | dBm/15kHz Note 5 | $dBm/BW_{Channel}$ |
| ±20 | ≥-3 dB | ≥1.4 MHz | FDD_A Note 7, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G Note 4 | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±14 | ≥-3 dB | ≥ 3 MHz | Note 3 | Note 3 | Note 3 |
| ±10 | ≥-3 dB | ≥ 5 MHz | Note 3 | Note 3 | Note 3 |
| ±7 | ≥-3 dB | ≥10 MHz | Note 3 | Note 3 | Note 3 |
| NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.<br>NOTE 2: Ts is the basic timing unit defined in TS 36.211. | | | | | |

NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with downlink bandwidth ≥1.4 MHz.
NOTE 4: Except Band 29.
NOTE 5: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 7: Except Band 32, Band 75, Band 76.

### 9.1.9.2 Measurement Report mapping

The reporting range of E-UTRAN FDD UE Rx-Tx time difference is defined from 0 to 20472$T_s$ with 2$T_s$ resolution for UE Rx-Tx time difference less than 4096$T_s$ and 8Ts for UE Rx-Tx time difference equal to or greater than 4096$T_s$.

The mapping of measured quantity is defined in Table 9.1.9.2-1.

**Table 9.1.9.2-1: UE Rx-Tx time difference measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RX-TX_TIME_DIFFERENCE_0000 | $T_{UE\ Rx-Tx} < 2$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_0001 | $2 \le T_{UE\ Rx-Tx} < 4$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_0002 | $4 \le T_{UE\ Rx-Tx} < 6$ | $T_s$ |
| … | … | … |
| RX-TX_TIME_DIFFERENCE_2046 | $4092 \le T_{UE\ Rx-Tx} < 4094$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_2047 | $4094 \le T_{UE\ Rx-Tx} < 4096$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_2048 | $4096 \le T_{UE\ Rx-Tx} < 4104$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_2049 | $4104 \le T_{UE\ Rx-Tx} < 4112$ | $T_s$ |
| … | … | … |
| RX-TX_TIME_DIFFERENCE_4093 | $20456 \le T_{UE\ Rx-Tx} < 20464$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_4094 | $20464 \le T_{UE\ Rx-Tx} < 20472$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_4095 | $20472 \le T_{UE\ Rx-Tx}$ | $T_s$ |

The reporting range of E-UTRAN TDD UE Rx-Tx time difference is defined from 624 to 21096$T_s$ with 2$T_s$ resolution for UE Rx-Tx time difference less than 4720$T_s$ and 8Ts for UE Rx-Tx time difference equal to or greater than 4720$T_s$.

The mapping of measured quantity is defined in Table 9.1.9.2-2.

**Table 9.1.9.2-2: EUTRAN TDD UE Rx-Tx time difference measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RX-TX_TIME_DIFFERENCE_TDD_0000 | $T_{UE\ Rx-Tx} < 626$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_0001 | $626 \le T_{UE\ Rx-Tx} < 628$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_0002 | $628 \le T_{UE\ Rx-Tx} < 630$ | $T_s$ |
| … | … | … |
| RX-TX_TIME_DIFFERENCE_TDD_2046 | $4716 \le T_{UE\ Rx-Tx} < 4718$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_2047 | $4718 \le T_{UE\ Rx-Tx} < 4720$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_2048 | $4720 \le T_{UE\ Rx-Tx} < 4728$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_2049 | $4728 \le T_{UE\ Rx-Tx} < 4736$ | $T_s$ |
| … | … | … |
| RX-TX_TIME_DIFFERENCE_TDD_4093 | $21080 \le T_{UE\ Rx-Tx} < 21088$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_4094 | $21088 \le T_{UE\ Rx-Tx} < 21096$ | $T_s$ |
| RX-TX_TIME_DIFFERENCE_TDD_4095 | $21096 \le T_{UE\ Rx-Tx}$ | $T_s$ |

### 9.1.9.3 Measurement Requirement under Time Domain Measurement Resource Restriction

The requirements in this section apply for UE configured with a time-domain measurement resource restriction pattern for PCell measurements. The UE Rx-Tx time difference is measured from the Pcell.

The accuracy requirements in Table 9.1.9.3-1 are valid under the following conditions:

- Cell specific reference signals are transmitted either from one, two or four antenna ports,
- Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled,

- No changes to the uplink transmission timing are applied during the measurement period,

$RSRP|_{dBm}$ according to Annex B.3.5 for a corresponding Band,

- The time domain measurement resource restriction pattern configured for the PCell indicates at least one subframe per radio frame for performing the PCell measurements [2],

- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern.

**Table 9.1.9.3-1: UE Rx–Tx time difference measurement accuracy under time domain measurement resource restriction**

| Accuracy | Conditions | | | | |
|---|---|---|---|---|---|
| | Ês/Iot Note 6 | Downlink transmission bandwidth of PCell | Io Note 1, 5 range | | |
| | | | E-UTRA operating band groups Note 8 | Minimum Io | Maximum Io |
| Ts Note 2 | dB | MHz | | dBm/15kHz Note 7 | $dBm/BW_{Channel}$ |
| ±20 | ≥-3 dB | ≤ 3 MHz | FDD_A Note 9, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G Note 4 | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±10 | ≥-3 dB | ≥ 5 MHz | Note 3 | Note 3 | Note 3 |

NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.
NOTE 2: Ts is the basic timing unit defined in TS 36.211.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with downlink bandwidth ≤ 3 MHz.
NOTE 4: Except Band 29.
NOTE 5: Io is defined for the subframes indicated by the time-domain measurement resource restriction pattern for serving cell measurements. The specified Io range applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 6: CRS Ês/Iot is in subframes indicated for PCell measurements by the time-domain measurement resource restriction pattern.
NOTE 7: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 8: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 9: Except Band 32, Band 75, Band 76**.**

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

### 9.1.9.4 Measurement Requirement when Time Domain Measurement Resource Restriction Pattern is Configured with CRS Assistance Information

The UE Rx-Tx time difference measurement is performed for the PCell.

For UE configured with a time-domain measurement resource restriction pattern for PCell measurements, the accuracy requirements in Table 9.1.9.4-1 apply provided that the following conditions are met for the PCell:

- PCell cell specific reference signals are transmitted from one, two or four antenna ports,

- Conditions defined in 36.101 Section 7.3 for reference sensitivity are fulfilled,

- No changes to the uplink transmission timing are applied during the measurement period,

- $RSRP|_{dBm}$ according to Annex B.3.13 for a corresponding Band,

- The time domain measurement resource restriction pattern configured for the measured cell indicates at least one subframe per radio frame for performing the RSRP measurement,

- Four symbols containing CRS are available in all subframes indicated by the time domain measurement resource restriction pattern, and
- The UE is provided via PCell with the CRS assistance information (TS 36.331 [2]) and the CRS assistance information is valid throughout the entire evaluation period.

The requirements in this section shall also be met when the number of transmit antenna ports [16] of one or more cells whose CRS assistance information is provided [2] is different from the number of transmit antenna ports of the measured cell.

When the CRS assistance information is provided, the transmission bandwidth [30] in all intra-frequency cells in the CRS assistance information [2] is the same or larger than the transmission bandwidth of the PCell for which measurement is performed.

**Table 9.1.9.4-1: UE Rx–Tx time difference measurement accuracy**

| Accuracy | Conditions | | | | |
|---|---|---|---|---|---|
| | CRS Ês/Iot Note 6 | Downlink transmission bandwidth of PCell | Io range Note 5 | | |
| | | | E-UTRA operating band groups Note 8 | Minimum Io Note 1, 7 | Maximum Io |
| Ts Note 2 | dB | MHz | | dBm/15kHz Note 7 | dBm/$BW_{Channel}$ |
| ±20 | ≥-7.76 | ≤ 3 MHz | FDD_A Note 9, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G Note 4 | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±10 | ≥-7.76 | ≥ 5 MHz | Note 3 | Note 3 | Note 3 |

NOTE 1: This Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with downlink bandwidth ≤ 3 MHz.
NOTE 4: Except Band 29.
NOTE 5: Io is defined in subframes indicated for PCell measurements by the time domain measurement resource restriction pattern. The specified Io range applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.
NOTE 6: CRS Ês/Iot is in subframes indicated for PCell measurements by the time-domain measurement resource restriction pattern.
NOTE 7: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 8: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 9: Except Band 32, Band 75, Band 76**.**

NOTE: It is up to the UE implementation whether the UE Rx-Tx time difference measurement is performed in any subframe or in subframes indicated by the time-domain measurement resource restriction pattern.

## 9.1.10 Reference Signal Time Difference (RSTD)

NOTE: This measurement is used for UE positioning purposes.

### 9.1.10.1 Intra-Frequency Accuracy Requirement

The accuracy requirements in Table 9.1.10.1-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.6 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

If using CRS, in addition to PRS, is enabled in the OTDOA assistance data, the CRS measurement bandwidth is not smaller than the minimum PRS bandwidth.

**Table 9.1.10.1-1: RSTD measurement accuracy**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | | | | Io [Note 7] range | | |
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* [Note 5] | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | E-UTRA operating band groups [Note 8] | Minimum Io [Note 1] | Maximum Io |
| Ts [Note 2] | dB | RB | | | dBm/15kHz Note 6 | $dBm/BW_{Channel}$ |
| ±15 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 6 | 6 | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±10 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 15 | 6 | Note 4 | Note 4 | Note 4 |
| ±6 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 25 | ≥ 2 | Note 4 | Note 4 | Note 4 |
| ±5 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 50 | ≥ 1 | Note 4 | Note 4 | Note 4 |
| ±4 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 75 | ≥ 1 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 6: The condition level is increased by $\Delta>0$, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 7: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 8: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.10.2 Inter-Frequency Accuracy Requirement

The accuracy requirements in Table 9.1.10.2-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.7 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes in cells belonging to the serving carrier frequency.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

If using CRS, in addition to PRS, is enabled in the OTDOA assistance data, the CRS measurement bandwidth is not smaller than the minimum PRS bandwidth.

**Table 9.1.10.2-1: RSTD measurement accuracy**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | PRS Ês/Iot | Minimum PRS bandwidth which is minimum of serving cell channel bandwidth[Note 7] and the PRS bandwidths of the reference cell and the measured neighbour cell *i* | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | Io [Note 6] range | | |
| | | | | E-UTRA operating band groups [Note 8] | Minimum Io [Note 1] | Maximum Io |
| Ts [Note 2] | dB | RB | | | dBm/15kHz Note 5 | $dBm/BW_{Channel}$ |
| ±21 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 6 | 4 [NOTE 9] | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±16 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 15 | 4 [NOTE 9] | Note 4 | Note 4 | Note 4 |
| ±10 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 25 | ≥ 2 [NOTE 9] | Note 4 | Note 4 | Note 4 |
| ±9 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 50 | ≥ 1 | Note 4 | Note 4 | Note 4 |
| ±8 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 75 | ≥ 1 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 7: If a CA capable UE is configured with one or two SCell(s), the serving cell channel bandwidth is the minimum of the serving cell channel bandwidths in the component carriers involved in the RSTD measurement. If any of the serving cells is not involved in this RSTD measurement for CA, the channel bandwidth of that serving cell is not included in the determination of the minimum PRS bandwidth.
NOTE 8: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 9: Requirement is not applicable if gap pattern with ID=2 or ID=3 is in use.

### 9.1.10.3 RSTD Measurement Report Mapping

The reporting range of RSTD is defined from -15391$T_s$ to 15391$T_s$ with 1$T_s$ resolution for absolute value of RSTD less or equal to 4096$T_s$ and 5Ts for absolute value of RSTD greater than 4096$T_s$.

The mapping of measured quantity is defined in Table 9.1.10.3-1.

**Table 9.1.10.3-1: RSTD report mapping**

| Reported Value | Measured Quantity Value | Unit |
|---|---|---|
| RSTD_0000 | -15391 > RSTD | $T_s$ |
| RSTD_0001 | -15391 ≤ RSTD < -15386 | $T_s$ |
| … | … | … |
| RSTD_2258 | -4106 ≤ RSTD < -4101 | $T_s$ |
| RSTD_2259 | -4101 ≤ RSTD < -4096 | $T_s$ |
| RSTD_2260 | -4096 ≤ RSTD < -4095 | $T_s$ |
| RSTD_2261 | -4095 ≤ RSTD < -4094 | $T_s$ |
| … | … | … |
| RSTD_6353 | -3 ≤ RSTD < -2 | $T_s$ |
| RSTD_6354 | -2 ≤ RSTD < -1 | $T_s$ |
| RSTD_6355 | -1 ≤ RSTD ≤ 0 | $T_s$ |
| RSTD_6356 | 0 < RSTD ≤ 1 | $T_s$ |
| RSTD_6357 | 1 < RSTD ≤ 2 | $T_s$ |
| RSTD_6358 | 2 < RSTD ≤ 3 | $T_s$ |
| … | … | … |
| RSTD_10450 | 4094 < RSTD ≤ 4095 | $T_s$ |
| RSTD_10451 | 4095 < RSTD ≤ 4096 | $T_s$ |
| RSTD_10452 | 4096 < RSTD ≤ 4101 | $T_s$ |
| RSTD_10453 | 4101 < RSTD ≤ 4106 | $T_s$ |
| … | … | … |
| RSTD_12709 | 15381 < RSTD ≤ 15386 | $T_s$ |
| RSTD_12710 | 15386 < RSTD ≤ 15391 | $T_s$ |
| RSTD_12711 | 15391 < RSTD | $T_s$ |

### 9.1.10.4 Higher-Resolution RSTD Measurement Report Mapping

The reporting range of higher-resolution RSTD is defined from -15391 $T_s$ to 15391 $T_s$ with 0.5 $T_s$ resolution.

The UE shall report a reference quantity based on Table 9.1.10.3-1 and a relative quantity $\Delta_{RSTD}$ defined in Table 9.1.10.4-1, so that the difference between the measured RSTD quantity and the lower bound of the corresponding range from Table 9.1.10.3-1 is between $\Delta_{RSTD}$ and $\Delta_{RSTD}$+ *resolutionStep*.

RSTD_delta_0 or RSTD_delta_1 specified in Table 9.1.10.4-1 can be reported together with any value from Table 9.1.10.3-1 in the range from RSTD_2260 to RSTD_10451. In this case, *resolutionStep* is 0.5.

Any relative quantity value from Table 9.1.10.4-1, except RSTD_delta_1, can be reported together with any value from Table 9.1.10.3-1 in the range from RSTD_0000 to RSTD_2259 or in the range from RSTD_10452 to RSTD_12711. In this case, *resolutionStep* is 1.0.

**Table 9.1.10.4-1: Relative quantity mapping for higher-resolution RSTD measurement reporting**

| Reported Relative Quantity Value | Measured Relative Quantity Value, $\Delta_{RSTD}$ | Unit |
|---|---|---|
| RSTD_delta_0 | 0 | $T_s$ |
| RSTD_delta_1 | 0.5 | $T_s$ |
| RSTD_delta_2 | 1.0 | $T_s$ |
| RSTD_delta_3 | 2.0 | $T_s$ |
| RSTD_delta_4 | 3.0 | $T_s$ |
| RSTD_delta_5 | 4.0 | $T_s$ |

### 9.1.10.5 Intra-Frequency Accuracy Requirement for UE Category 1bis

The accuracy requirements in Table 9.1.10.5-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.6 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 µs.

**Table 9.1.10.5-1: RSTD measurement accuracy**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* Note 5 | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | Io Note 7 range | | |
| | | | | E-UTRA operating band groups Note 8 | Minimum Io Note 1 | Maximum Io |
| Ts Note 2 | dB | RB | | | dBm/15kHz Note 6 | $dBm/BW_{Channel}$ |
| ±15 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 6 | 6 | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±10 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 15 | 6 | Note 4 | Note 4 | Note 4 |
| ±6 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 25 | ≥ 2 | Note 4 | Note 4 | Note 4 |
| ±5 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 50 | ≥ 1 | Note 4 | Note 4 | Note 4 |
| ±4 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 75 | ≥ 1 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.

NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 7: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.10.6 Inter-Frequency Accuracy Requirement for UE Category 1bis

The accuracy requirements in Table 9.1.10.6-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.7 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes in cells belonging to the serving carrier frequency.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.10.6-1: RSTD measurement accuracy**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | PRS Ês/Iot | Minimum PRS bandwidth which is minimum of serving cell channel bandwidth Note 7 and the PRS bandwidths of the reference cell and the measured neighbour cell *i* | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | Io Note 6 range | | |
| | | | | E-UTRA operating band groups Note 8 | Minimum Io Note 1 | Maximum Io |
| Ts Note 2 | dB | RB | | | dBm/15kHz Note 5 | $dBm/BW_{Channel}$ |
| ±21 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 6 | 4 | FDD_A, TDD_A | -121 | -50 |
| | | | | FDD_B1 | -120.5 | -50 |
| | | | | FDD_C, TDD_C | -120 | -50 |
| | | | | FDD_D | -119.5 | -50 |
| | | | | FDD_E, TDD_E | -119 | -50 |
| | | | | FDD_F | -118.5 | -50 |
| | | | | FDD_G | -118 | -50 |
| | | | | FDD_H | -117.5 | -50 |
| | | | | FDD_N | -114.5 | -50 |
| ±16 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 15 | 4 | Note 4 | Note 4 | Note 4 |
| ±10 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 25 | ≥ 2 | Note 4 | Note 4 | Note 4 |
| ±9 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 50 | ≥ 1 | Note 4 | Note 4 | Note 4 |
| ±8 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 75 | ≥ 1 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.

NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.11 Carrier aggregation measurement accuracy

This clause contains requirements on UE capabilities for support of E-UTRA FDD, TDD and TDD-FDD carrier aggregation. Requirements in this clause are applicable to all carrier aggregation capable UEs which have been configured with up to six downlink SCell(s). Note: This clause covers measurement accuracy requirements for frequencies corresponding to those used for the PCell and SCell(s); measurements of any other frequency are considered to be inter-frequency measurements covered by the accuracy requirements in clause 9.1.3 for inter-frequency RSRP, clause 9.1.6 for inter-frequency RSRQ, and clause 9.1.17.3 for inter-frequency RS-SINR.

The requirements in this clause apply for bandwidths defined in the bandwidth combination set for the CA configurations supported by the UE [5].

### 9.1.11.1 Primary component carrier accuracy requirement

RSRP measurements of cells on the primary component carrier shall meet the intra-frequency absolute accuracy requirements in section 9.1.2.1.

RSRQ measurements of cells on the primary component carrier shall meet the intra-frequency absolute accuracy requirements in section 9.1.5.1.

RS-SINR measurements of cells on the primary component carrier shall meet the intra-frequency absolute accuracy requirements in section 9.1.17.2.1.

Comparisons between RSRP of cells on the primary component carrier shall also meet the intra-frequency relative accuracy requirements in sections 9.1.2.2.

### 9.1.11.2 Secondary component carrier accuracy requirement

RSRP measurements of cells on any of the secondary component carrier(s) shall meet the intra-frequency absolute accuracy requirements in section 9.1.2.1.

RSRQ measurements of cells on any of the secondary component carrier(s) shall meet the intra-frequency absolute accuracy requirements in section 9.1.5.1.

RS-SINR measurements of cells on any of the secondary component carrier(s) shall meet the intra-frequency absolute accuracy requirements in section 9.1.17.2.1.

Comparisons between RSRP of cells on the same secondary component carrier shall meet the intra-frequency relative accuracy requirements in sections 9.1.2.2

### 9.1.11.3 Primary and secondary component carrier relative accuracy requirement

When measurements of cells on the primary component carrier are compared with measurements of cells on any of the secondary component carrier(s), the applicable relative accuracy requirements are:

RSRP inter-frequency accuracy requirements in section 9.1.3.2,

RSRQinter-frequency accuracy requirements in section 9.1.6.2,

RS-SINR inter-frequency accuracy requirements in section 9.1.17.3.2.

### 9.1.11.4 Secondary component carrier relative accuracy requirement

When measurements of cells on any of the secondary component carrier(s) are compared with measurements of cells on the other secondary component carrier, the applicable relative accuracy requirements are:

RSRP inter-frequency accuracy requirements in section 9.1.3.2,

RSRQ inter-frequency accuracy requirements in section 9.1.6.2,

RS-SINR inter-frequency accuracy requirements in section 9.1.17.3.2.

## 9.1.12 Reference Signal Time Difference (RSTD) Measurement Accuracy Requirements for Carrier Aggregation

This clause contains requirements for E-UTRA FDD, TDD and TDD-FDD carrier aggregation. This clause contains RSTD measurement accuracy requirements for a UE configured with one or two downlink SCell(s). The UE may operate in one of the E-UTRA carrier aggregations listed in clause 8.3.1. The requirements in this clause shall apply regardless whether the configured downlink secondary cell is activated or deactivated by the MAC-CE command [17]. The requirements apply for bandwidths defined in the bandwidth combination set for the CA configurations supported by the UE [5].

The RSTD measurements, which are obtained when both the reference cell and neighbouring cell belong to the primary component carrier, shall meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

The RSTD measurements, which are obtained when both the reference cell and neighbouring cell belong to the same secondary component carrier, shall meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

The RSTD measurements, which are obtained when the reference cell and neighbouring cell do not belong to the same carrier, shall meet the inter-frequency RSTD accuracy requirements defined in clause 9.1.10.2.

## 9.1.13 Measurement accuracy for UE category 0

### 9.1.13.1 Intra-frequency Absolute RSRP Accuracy for UE category 0

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell for UE category 0.

The accuracy requirements in Table 9.1.13.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.27 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.13.1-1: RSRP Intra frequency absolute accuracy for UE category 0**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±7 | ±10 | ≥-6 dB | FDD-0_A, TDD-0_A | -121 | N/A | -70 |
| | | | FDD-0_B | -120.5 | N/A | -70 |
| | | | FDD-0_C, TDD-0_C | -120 | N/A | -70 |
| | | | FDD-0_D | -119.5 | N/A | -70 |
| | | | FDD-0_E, TDD-0_E | -119 | N/A | -70 |
| | | | FDD-0_F | -118.5 | N/A | -70 |
| | | | FDD-0_G | -118 | N/A | -70 |
| | | | FDD-0_H | -117.5 | N/A | -70 |
| | | | FDD-0_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD-0_A, TDD-0_A, FDD-0_B, FDD-0_C, TDD-0_C, FDD-0_D, FDD-0_E, TDD-0_E, FDD-0_F, FDD-0_G, FDD-0_H, FDD-0_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by $\Delta>0$, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.13.2 Intra-frequency Relative Accuracy of RSRP for UE category 0

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency for category 0 UE.

The accuracy requirements in Table 9.1.13.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.28 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.13.2-1: RSRP Intra frequency relative accuracy for UE category 0**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FDD-0_A, TDD-0_A | -121 | -50 |
| | | | FDD-0_B | -120.5 | -50 |
| | | | FDD-0_C, TDD-0_C | -120 | -50 |
| | | | FDD-0_D | -119.5 | -50 |
| | | | FDD-0_E, TDD-0_E | -119 | -50 |
| | | | FDD-0_F | -118.5 | -50 |
| | | | FDD-0_G | -118 | -50 |
| | | | FDD-0_H | -117.5 | -50 |
| | | | FDD-0_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.13.3 Intra-frequency Absolute RSRQ Accuracy for UE category 0

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell for category 0 UE.

The accuracy requirements in Table 9.1.13.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.27 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRQ measurement assuming measured cell is identified cell.

**Table 9.1.13.3-1: RSRQ Intra frequency absolute accuracy for UE category 0**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±3.5 | ±5 | ≥-3 dB | FDD-0_A, TDD-0_A | -121 | -50 |
| | | | FDD-0_B | -120.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD-0_C, TDD-0_C | -120 | -50 |
| | | | FDD-0_D | -119.5 | -50 |
| | | | FDD-0_E, TDD-0_E | -119 | -50 |
| | | | FDD-0_F | -118.5 | -50 |
| | | | FDD-0_G | -118 | -50 |
| | | | FDD-0_H | -117.5 | -50 |
| | | | FDD-0_N | -114.5 | -50 |
| ±4.5 | ±5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.14 Accuracy requirements for Discovery Signal Measurements

### 9.1.14.1 Introduction

Discovery signal measurements are performed when higher layers indicate measurements based on discovery signals according to DMTC configuration [2]. The discovery measurement accuracy requirements are defined for the following physical layer measurements performed in discovery signal occasions [16],

RSRP measured in subframes of the configured discovery signal occasions as specified in [4],

CSI-RSRP measurements specified in [4],

RSRQ measured in subframes of the configured discovery signal occasions as specified in [4].

### 9.1.14.2 RSRP measurements in discovery signal occasions

Intra-frequency absolute RSRP measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.2.1.

Intra-frequency relative RSRP measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.2.2.

Inter-frequency absolute RSRP measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.3.1.

Inter-frequency relative RSRP measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.3.2.

Measurement report mapping for RSRP measurements in discovery signal occasions are the same as specified in Section 9.1.4.

### 9.1.14.3 CSI-RSRP measurements in discovery signal occasions

#### 9.1.14.3.1 Intra-frequency CSI-RSRP measurements

##### 9.1.14.3.1.1 Absolute CSI-RSRP measurement requirements

In this clause, absolute CSI-RSRP measurement accuracy requirements in discovery signal occasions apply to a cell or TP on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.14.3.1.1-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP,

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is specified in Annex B.3.14 for a corresponding Band.

**Table 9.1.14.3.1.1-1: Intra-frequency absolute CSI-RSRP measurement accuracy**

| Accuracy | Conditions |
|---|---|

| Normal condition | Extreme condition | CSI Ês/Iot | Io Note 1 range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4.5 | ±9 | ≥ 0 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥0 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

#### 9.1.14.3.1.2 Relative CSI-RSRP measurement requirements

In this section, the relative CSI-RSRP measurement is defined as the CSI-RSRP measured from one cell or TP compared to the CSI-RSRP measured on the same frequency from another cell or from another TP. If two TPs are compared, they may belong to the same or different cells.

The accuracy requirements in Table 9.1.14.3.1.2-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is specified in Annex B.3.15 for a corresponding Band.

**Table 9.1.14.3.1.2-1: Intra-frequency relative CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | CSI Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±2 | ±3 | ≥0 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter CSI Ês/Iot is the minimum CSI Ês/Iot of the pair of cells or TPs to which the requirement applies.
NOTE 3: Void
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.14.3.2 Inter-frequency CSI-RSRP measurements

#### 9.1.14.3.2.1 Absolute CSI-RSRP measurement requirements

In this clause, absolute CSI-RSRP measurement accuracy requirements for discovery signal measurements apply to a cell or TP on a different carrier frequency from that of the serving cell.

The accuracy requirements in Table 9.1.14.3.2.1-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is specified in Annex B.3.16 for a corresponding Band.

**Table 9.1.14.3.2.1-1: Inter-frequency absolute CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | CSI Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4.5 | ±9 | ≥0 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥0 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

#### 9.1.14.3.2.2 Relative CSI-RSRP measurement requirements

In this section, the relative CSI-RSRP measurement is defined as the CSI-RSRP measured from one cell or TP compared to the CSI-RSRP measured on a different frequency from another cell or from another TP.

The accuracy requirements in Table 9.1.14.3.2.2-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is specified in Annex B.3.17 for a corresponding Band.

$$\left|CSI_RSRP1\right|_{dBm} - CSI_RSRP2\left|_{dBm}\right| \le 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.14.3.2.2-1: Inter-frequency relative CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | CSI Ês/Iot Note 2 | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| | | | FDD_A, TDD_A | -121 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±4.5 | ±6 | ≥0 dB | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter CSI Ês/Iot is the minimum CSI Ês/Iot of the pair of cells or TPs to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

#### 9.1.14.3.3 CSI-RSRP measurement report mapping

The reporting range of CSI-RSRP is defined from -140 dBm to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 9.1.14.3.3-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.14.3.3-1: CSI-RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| CSI_RSRP_00 | CSI_RSRP < -140 | dBm |
| CSI_RSRP _01 | -140 ≤ CSI_RSRP < -139 | dBm |
| CSI_RSRP _02 | -139 ≤ CSI_RSRP < -138 | dBm |
| … | … | … |
| CSI_RSRP _95 | -46 ≤ CSI_RSRP < -45 | dBm |
| CSI_RSRP _96 | -45 ≤ CSI_RSRP < -44 | dBm |
| CSI_RSRP _97 | -44 ≤ CSI_RSRP | dBm |

### 9.1.14.4 RSRQ measurements in discovery signal occasions

Intra-frequency absolute RSRQ measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.5.1.

Inter-frequency absolute RSRQ measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.6.1.

Inter-frequency relative RSRQ measurement accuracy requirements in discovery signal occasions are the same as specified in Section 9.1.6.2.

Measurement report mapping for RSRQ measurements in discovery signal occasions are the same as specified in Section 9.1.7.

## 9.1.15 Discovery signal measurements accuracy for E-UTRAN carrier aggregation

This clause contains requirements on UE capabilities for support of E-UTRA FDD, TDD and TDD-FDD carrier aggregation when discovery signal [16] is configured. Requirements in this clause are applicable to all carrier aggregation capable UEs which have been configured with up to six downlink SCell(s). Note : This clause covers measurement accuracy requirements for frequencies corresponding to those used for the PCell and SCell(s). Measurements of any other frequency are considered to be inter-frequency measurements covered by the accuracy requirements in clause 9.1.14.

The requirements in this clause apply for bandwidths defined in the bandwidth combination set for the CA configurations supported by the UE [5].

#### 9.1.15.1 Requirements for CRS based discovery signal measurements accuracy for E-UTRAN carrier aggregation

##### 9.1.15.1.1 Primary component carrier accuracy requirement

RSRP and RSRQ measurements of cells on the primary component carrier shall meet the intrafrequency absolute accuracy requirements in sections 9.1.14.2 and 9.1.14.4. Comparisons between RSRP of cells on the primary component carrier shall also meet the intra-frequency relative accuracy requirements in sections 9.1.14.2.

##### 9.1.15.1.2 Secondary component carrier accuracy requirement

RSRP and RSRQ measurements of cells on any of the secondary component carrier(s) shall meet the intrafrequency absolute accuracy requirements in sections 9.1.14.2 and 9.1.14.4. Comparisons between RSRP of cells on the same secondary component carrier shall meet the intra-frequency relative accuracy requirements in sections 9.1.14.2.

##### 9.1.15.1.3 Primary and secondary component carrier relative accuracy requirement

When measurements of cells on the primary component carrier are compared with measurements of cells on any of the secondary component carrier(s), the applicable relative accuracy requirements are the RSRP and RSRQ inter-frequency accuracy requirements in sections 9.1.14.2 and 9.1.14.4.

##### 9.1.15.1.4 Secondary component carrier relative accuracy requirement

When measurements of cells on any of the secondary component carrier(s) are compared with measurements of cells on the other secondary component carrier, the applicable relative accuracy requirements are the RSRP and RSRQ inter-frequency accuracy requirements in sections 9.1.14.2 and 9.1.14.4.

#### 9.1.15.2 Requirements for CSI-RS based discovery signal measurements accuracy for E-UTRAN carrier aggregation

##### 9.1.15.2.1 Primary component carrier accuracy requirement

RSRP measurements of cells on the primary component carrier shall meet the intrafrequency absolute accuracy requirements in sections 9.1.14.3.1.1. Comparisons between RSRP of cells on the primary component carrier shall also meet the intra-frequency relative accuracy requirements in sections 9.1.14.3.1.2.

##### 9.1.15.2.2 Secondary component carrier accuracy requirement

RSRP measurements of cells on any of the secondary component carrier(s) shall meet the intrafrequency absolute accuracy requirements in sections 9.1.14.3.1.1. Comparisons between RSRP of cells on the same secondary component carrier shall meet the intra-frequency relative accuracy requirements in sections 9.1.14.3.1.2.

##### 9.1.15.2.3 Primary and secondary component carrier relative accuracy requirement

When measurements of cells on the primary component carrier are compared with measurements of cells on any of the secondary component carrier(s), the applicable relative accuracy requirements are the RSRP inter-frequency accuracy requirements in sections 9.1.14.3.2.2.

##### 9.1.15.2.4 Secondary component carrier relative accuracy requirement

When measurements of cells on any of the secondary component carrier(s) are compared with measurements of cells on the other secondary component carrier, the applicable relative accuracy requirements are the RSRP inter-frequency accuracy requirements in sections 9.1.14.3.2.2.

### 9.1.16 Accuracy requirements for RSRQ measurement on all OFDM symbols

This clause contains requirements for RSRQ measurement when measurement configuration message received by the UE contains *measRSRQ-OnAllSymbols-r12* parameter in TS 36.331 [2].

Intra-frequency absolute RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.5.1.

Inter-frequency absolute RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.6.1.

Inter-frequency relative RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.6.2.

NOTE: The minimum Io condition in Table 9.1.5.1-1, Table 9.1.6.1-1 and Table 9.1.6.2-1 is expressed as the average Io per RE over all REs in that symbol.

NOTE: The Io range defined by the minimum and the maximum Io levels in Table 9.1.5.1-1, Table 9.1.6.1-1 and Table 9.1.6.2-1applies to CRS and non-CRS symbols. Io may be different in different symbols within a subframe.

NOTE: Iot in Table 9.1.5.1-1, Table 9.1.6.1-1 and Table 9.1.6.2-1 is the received power spectrum density of total interference and noise averaged over CRS REs.

Intra-frequency absolute WB-RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.5.4.

Inter-frequency absolute WB-RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.6.3.

Inter-frequency relative WB-RSRQ measurement accuracy requirements when measured on all OFDM symbols are the same as specified in Section 9.1.6.4.

NOTE: The minimum Io condition in Table 9.1.5.4-1, Table 9.1.6.3-1 and Table 9.1.6.4-1 is expressed as the average Io per RE over all REs in that symbol across all the resource blocks within the *AllowedMeasBandwidth* in TS 36.331 [2].

NOTE: The Io1, Io2 and Io range defined by the minimum and the maximum Io levels in Table 9.1.5.4-1, Table 9.1.6.3-1 and Table 9.1.6.4-1 applies to CRS and non-CRS symbols. Io1, Io2 and Io may be different in different symbols within a subframe.

NOTE: Iot in Table 9.1.5.4-1, Table 9.1.6.3-1 and Table 9.1.6.4-1 is the received power spectrum density of total interference and noise averaged over CRS REs.

## 9.1.17 RS-SINR Measurements

### 9.1.17.1 Measurement Report Mapping

The reporting range of RS-SINR measurement is defined from -23 dB to 40 dB with 0.5 dB resolution.

The mapping of the measured quantity is defined in table 9.1.17.1 -1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.17.1-1: RS-SINR measurement report mapping**

| Reported Value | Measured Quantity Value | Unit |
|---|---|---|
| RS-SINR_000 | RS-SINR < -23 | dB |
| RS-SINR_001 | -23 ≤ RS-SINR < -22.5 | dB |
| … | … | … |
| RS-SINR_126 | 39.5 ≤ RS-SINR < 40 | dB |
| RS-SINR_127 | 40 ≤ RS-SINR | dB |

### 9.1.17.2 Intra-frequency RS-SINR Measurement Accuracy Requirements

#### 9.1.17.2.1 Absolute RS-SINR Measurement Accuracy Requirements

The requirements for absolute accuracy of intra-frequency RS-SINR in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Table 9.1.17.2.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.18 for a corresponding Band.

**Table 9.1.17.2.1-1: Intra-frequency RS-SINR absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | $dBm/BW_{Channel}$ |
| ±3.0 | ±4 | ≥-3 dB [Note 5] | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by $\Delta>0$, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.<br>NOTE 5: The requirements apply for Ês/Iot ≤ 25 dB. | | | | | |

## 9.1.17.3 Inter-frequency RS-SINR Measurement Accuracy Requirements

### 9.1.17.3.1 Absolute RS-SINR Measurement Accuracy Requirements

The requirements for absolute accuracy of inter-frequency RS-SINR in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.17.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.19 for a corresponding Band.

**Table 9.1.17.3.1-1: Inter-frequency RS-SINR absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | $dBm/BW_{Channel}$ |
| ±3.0 | ±4 | ≥-3 dB [Note 5] | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth. | | | | | |

NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 5: The requirements apply for Ês/Iot ≤ 25 dB.

#### 9.1.17.3.2 Relative RS-SINR Measurement Accuracy Requirements

The relative accuracy of inter-frequency RS-SINR in this clause is defined as the RS-SINR measured from one cell compared to the RS-SINR measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.17.3.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.20 for a corresponding Band.

$$\left| RSRP1 \right|_{dBm} - RSRP2 \left|_{dBm} \right| \leq 27 dB$$

| Channel 1_Io - Channel 2_Io | ≤ 20 dB

**Table 9.1.17.3.2-1: Inter-frequency RS-SINR relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot [Note 2] | E-UTRA operating band groups [Note 5] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 4] | dBm/$BW_{Channel}$ |
| ±3.5 | ±4 | ≥-3 dB [Note 6] | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±4.0 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 6: The requirements apply for Ês/Iot ≤ 25 dB.

### 9.1.18 Accuracy Requirements for Measurements under Operation with Frame Structure 3

#### 9.1.18.1 Introduction

The accuracy requirements in this section are defined for the following physical layer measurements: RSRP, RSRQ, CSI-RSRP, and RSSI, where the measurements are performed on cells of E-UTRA carriers during the configured DMTC occasion [2] under operation with frame structure 3 [16].

#### 9.1.18.2 RSRP measurements

##### 9.1.18.2.1 RSRP measurement report mapping

The measurement report mapping for RSRP measurements is as defined in Section 9.1.4.

### 9.1.18.2.2 Inter-frequency absolute RSRP measurement accuracy requirements

The requirements for absolute accuracy of RSRP in this clause apply to a cell that has a different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.18.2.2-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.23.1 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.2.2-1: RSRP inter-frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | Io [Note 1] range | | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FS3_G | -118 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FS3_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.18.2.3 Inter-frequency relative RSRP measurement accuracy requirements

The relative accuracy of inter-frequency RSRP measurement is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.18.2.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1|_{dBm} - RSRP2|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.2.3-1: RSRP inter-frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot [Note 2] | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 3] | $dBm/BW_{Channel}$ |
| ±4.5 | ±6 | ≥-6 dB | FS3_G | -118 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.18.2.4 Intra-frequency absolute RSRP measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

The requirements for absolute accuracy of RSRP in this clause apply to a cell on a serving carrier frequency.

The accuracy requirements in Table 9.1.18.2.4-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.21.1 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.2.4-1: RSRP intra frequency absolute accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FS3_G | -118 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FS3_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.18.2.5 Intra-frequency relative RSRP measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same carrier frequency.

The accuracy requirements in Table 9.1.18.2.5-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.22.1 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.2.5-1: RSRP intra frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±2 | ±3 | ≥-3 dB | FS3_G | -118 | -50 |
| ±3 | ±3 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.18.3 RSRQ measurements

### 9.1.18.3.1 RSRQ measurement report mapping

The measurement report mapping for RSRQ measurements is as defined in Section 9.1.7.

### 9.1.18.3.2 Inter-frequency absolute RSRQ measurement accuracy requirements

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Table 9.1.18.3.2-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.23.2 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.3.2-1: RSRQ inter-frequency absolute accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-3 dB | FS3_G | -118 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.18.3.3 Inter-frequency relative RSRQ measurement accuracy requirements

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Table 9.1.18.3.3-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2|$_{dBm}$ according to Annex B.3.24.2 for a corresponding Band.

$$\left| RSRP1\big|_{dBm} - RSRP2\big|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.3.3-1: RSRQ inter-frequency relative accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FS3_G | -118 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.18.3.4 Intra-frequency absolute RSRQ measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on a serving carrier frequency.

The accuracy requirements in Table 9.1.18.3.4-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.21.2 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least four CRS symbols over two adjacent slots.

**Table 9.1.18.3.4-1: RSRQ intra frequency absolute accuracy**

| **Accuracy** | | **Conditions** | | | |
|---|---|---|---|---|---|
| **Normal condition** | **Extreme condition** | **Ês/Iot** | **Io [Note 1] range** | | |
| | | | **E-UTRA operating band groups [Note 4]** | **Minimum Io** | **Maximum Io** |
| **dB** | **dB** | **dB** | | **dBm/15kHz** [Note 3] | **dBm/BW$_{Channel}$** |
| ±2.5 | ±4 | ≥-3 dB | FS3_G | -118 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.18.4 CSI-RSRP measurements

### 9.1.18.4.1 CSI-RSRP measurement report mapping

The measurement report mapping for CSI-RSRP measurements is as defined in Section 9.1.14.3.3.

### 9.1.18.4.2 Inter-frequency absolute CSI-RSRP measurement accuracy requirements

In this clause, absolute CSI-RSRP measurement accuracy requirements for discovery signal measurements apply to a cell or TP operating under frame structure 3 [3] on a different carrier frequency from that of the serving cell.

The accuracy requirements in Table 9.1.18.4.2-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is as specified in Annex B.3.23.3 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least two CSI REs per resource block within the measured bandwidth in two adjacent slots.

**Table 9.1.18.4.2-1: Inter-frequency absolute CSI-RSRP measurement accuracy**

| **Accuracy** | **Conditions** |
|---|---|

| Normal condition | Extreme condition | CSI Ês/Iot | Io Note 1 range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| ±4.5 | ±9 | ≥0 dB | FS3_G | -118 | N/A | -70 |
| ±8 | ±11 | ≥0 dB | FS3_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.18.4.3 Inter-frequency relative CSI-RSRP measurement accuracy requirements

In this section, the relative CSI-RSRP measurement is defined as the CSI-RSRP measured from one cell or TP compared to the CSI-RSRP measured on a different frequency from another cell or from another TP, where at least one measured cell or TP is operating under frame structure 3 [3].

The accuracy requirements in Table 9.1.18.4.3-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is as specified in Annex B.3.24.3 for a corresponding Band.

$$\left|CSI_RSRP1\right|_{dBm} - CSI_RSRP2\left|_{dBm}\right| \le 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

The discovery signal occasion does not contain any MBSFN subframe and contains at least two CSI REs per resource block within the measured bandwidth in two adjacent slots.

**Table 9.1.18.4.3-1: Inter-frequency relative CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | CSI Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/$BW_{Channel}$ |
| ±4.5 | ±6 | ≥0 dB | FS3_G | -118 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter CSI Ês/Iot is the minimum CSI Ês/Iot of the pair of cells or TPs to which the requirement applies.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### 9.1.18.4.4 Intra-frequency absolute CSI-RSRP measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

In this clause, absolute CSI-RSRP measurement accuracy requirements in discovery signal occasions apply to a cell or TP on a serving carrier frequency operating under frame structure 3 [3].

The accuracy requirements in Table 9.1.18.4.4-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP,

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is as specified in Annex B.3.21.3 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least two CSI REs per resource block within the measured bandwidth in two adjacent slots of the same subframe or different subframes.

**Table 9.1.18.4.4-1: Intra-frequency absolute CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | CSI Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥0 dB | FS3_G | -118 | N/A | -70 |
| ±8 | ±11 | ≥0 dB | FS3_G | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.18.4.5 Intra-frequency relative CSI-RSRP measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

In this section, the relative CSI-RSRP measurement is defined as the CSI-RSRP measured from one cell or TP compared to the CSI-RSRP measured on the same frequency from another cell or from another TP operating under frame structure 3 [16]. If two TPs are compared, they may belong to the same or different cells.

The accuracy requirements in Table 9.1.18.4.5-1 are valid under the following conditions:

CSI reference signals in discovery signal occasions are transmitted on one antenna port only from each TP.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

CSI-RSRP is as specified in Annex B.3.22.3 for a corresponding Band.

The discovery signal occasion does not contain any MBSFN subframe and contains at least two CSI REs per resource block within the measured bandwidth in two adjacent slots of the same subframe or different subframes.

**Table 9.1.18.4.5-1: Intra-frequency relative CSI-RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | CSI Ês/Iot [Note 2] | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 5] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 4] | $dBm/BW_{Channel}$ |
| ±2 | ±3 | ≥ 0 dB | FS3_G | -118 | -50 |
| ±3 | ±3 | ≥ 0 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter CSI Ês/Iot is the minimum CSI Ês/Iot of the pair of cells or TPs to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.18.5 RSSI measurements

### 9.1.18.5.1 RSSI measurement report mapping

The reporting range of RSSI measurement is defined from -100 dBm to -25 dBm with 1 dBm resolution.

The mapping of the measured quantity is defined in table 9.1.18.5.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.18.5.1-1: RSSI measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RSSI_00 | RSSI < -100 | dBm |
| RSSI_01 | -100 ≤ RSSI < -99 | dBm |

| | | |
|---|---|---|
| RSSI_02 | -99 ≤ RSSI < -98 | dBm |
| … | … | … |
| RSSI_74 | -27 ≤ RSSI < -26 | dBm |
| RSSI_75 | -26 ≤ RSSI < -25 | dBm |
| RSSI_76 | -25 ≤ RSSI | dBm |

### 9.1.18.5.2 Intra-frequency absolute RSSI measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

The intra-frequency RSSI requirements are specified in Table 9.1.18.5.2-1. The requirements apply for any configured RSSI *measDuration* [2], provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same reporting interval.

**Table 9.1.18.5.2-1: Intra-frequency RSSI accuracy**

| Accuracy | | Conditions | | |
|---|---|---|---|---|
| | | Io Note 1 range | | |
| Normal condition | Extreme condition | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±3.5 | ±6.5 | FS3_G | -118 | -50 |
| ±5.5 | ±8.5 | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

The RSSI measurement bandwidth assumed in defining the accuracy requirements in Table 9.1.18.5.2-1 is 6 RB. UE may measure according to *AllowedMeasBandwidth*. UE which measures with a bandwidth other that 6RB shall scale the measured RSSI to report a nominal RSSI equivalent to 6RB measurement.

### 9.1.18.5.3 Inter-frequency absolute RSSI measurement accuracy requirements

The inter-frequency RSSI requirements are the same as specified in Section 9.1.18.5.2.

## 9.1.18.6 Channel occupancy measurements

### 9.1.18.6.1 Intra-frequency channel occupancy measurement accuracy requirements

NOTE: These requirements are applicable only for CA under operation with frame structure 3 [16].

The UE shall be able to correctly evaluate the intra-frequency channel occupancy configured according to 36.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,
- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

  RSSI at the UE receiver is below *channelOccupancyThreshold*- $\Delta_{RSSI}$ , or

  RSSI at the UE receiver is above *channelOccupancyThreshold*+ $\Delta_{RSSI}$ ,

  where $\Delta_{RSSI}$ is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in Section 9.1.18.5.2.

The UE expects that *channelOccupancyThreshold* [2] is configured assuming RSSI measurement bandwidth of 6 RB.

#### 9.1.18.6.2 Inter-frequency channel occupancy measurement accuracy requirements

The UE shall be able to correctly evaluate the inter-frequency channel occupancy configured according to 36.331 [2], provided that the following conditions are met:

- All symbols during each RSSI measurement duration are available for RSSI sampling within the same reporting interval,
- RSSI at the UE receiver meets the following condition with respect to the configured *channelOccupancyThreshold* [2]:

  RSSI at the UE receiver is below *channelOccupancyThreshold*- $\Delta_{RSSI}$ , or

  RSSI at the UE receiver is above *channelOccupancyThreshold*+ $\Delta_{RSSI}$ ,

  where $\Delta_{RSSI}$ is the applicable RSSI measurement accuracy value from the RSSI measurement accuracy requirements specified in Section 9.1.18.5.3.

The UE expects that *channelOccupancyThreshold* [2] is configured assuming RSSI measurement bandwidth of 6 RB.

## 9.1.19 Accuracy Requirements for Carrier Aggregation for Measurements under Operation with Frame Structure 3

### 9.1.19.1 Introduction

The accuracy requirements in this section are defined for the following physical layer measurements: RSRP, RSRQ, CSI-RSRP, and RSSI, where the measurements are performed on cells of E-UTRA carriers during the configured DMTC occasion [2] under operation with frame structure 3 [16].

### 9.1.19.2 Accuracy requirements for measurements on SCC

The requirements in this section are for the measurements on cells of E-UTRA carriers operated under frame structure 3 on one SCC.

Absolute RSRP measurements of cells on SCC shall meet the intra-frequency absolute accuracy requirements in Section 9.1.18.2.4.

Comparisons between RSRP measurements of cells on the same SCC shall meet the intra-frequency relative accuracy requirements in Section 9.1.18.2.5.

Absolute RSRQ measurements of cells on SCC shall meet the intra-frequency absolute accuracy requirements in Section 9.1.18.3.4.

CSI-RSRP measurements of cells on SCC shall meet the intra-frequency absolute accuracy requirements in Section 9.1.18.4.4.

Comparisons between CSI-RSRP measurements of cells on the same SCC shall meet the intra-frequency relative accuracy requirements in Section 9.1.18.4.5.

RSSI measurements on SCC shall meet the intra-frequency absolute accuracy requirements in Section 9.1.18.5.3.

### 9.1.19.3 Relative accuracy requirements for measurements on different SCCs

The requirements in this section are for the measurements on cells of E-UTRA carriers operated under frame structure 3 on two different SCCs.

When RSRP measurements of cells on any of the SCC are compared with RSRP measurements of cells on the other SCC, the applicable relative accuracy requirements are the inter-frequency relative RSRP measurement accuracy requirements in Section 9.1.18.2.3.

When RSRQ measurements of cells on any of the SCC are compared with RSRQ measurements of cells on the other SCC, the applicable relative accuracy requirements are the inter-frequency relative RSRQ measurement accuracy requirements in Section 9.1.18.3.3.

When CSI-RSRP measurements of cells on any of the SCC are compared with CSI-RSRP measurements of cells on the other SCC, the applicable relative accuracy requirements are the inter-frequency relative CSI-RSRP measurement accuracy requirements in Section 9.1.18.4.3.

### 9.1.19.4 Relative accuracy requirements for measurements on SCC and PCC

The requirements in this section are for the measurements on cells of an E-UTRA carrier operated under frame structure 3 on SCC and cells on an E-UTRA carrier operated under frame structure 1 or 2 on PCC.

When RSRP measurements of cells on any of the SCC are compared with RSRP measurements of cells on the PCC, the applicable relative accuracy requirements are the inter-frequency relative RSRP measurement accuracy requirements in Section 9.1.18.2.3.

When RSRQ measurements of cells on any of the SCC are compared with RSRQ measurements of cells on the PCC, the applicable relative accuracy requirements are the inter-frequency relative RSRQ measurement accuracy requirements in Section 9.1.18.3.3.

When CSI-RSRP measurements of cells on any of the SCC are compared with CSI-RSRP measurements of cells on the PCC, the applicable relative accuracy requirements are the inter-frequency relative CSI-RSRP measurement accuracy requirements in Section 9.1.18.4.3.

## 9.1.20 SFN and Subframe Time Difference (SSTD)

### 9.1.20.1 SSTD Accuracy Requirement

The SFN and subframe time difference (SSTD) is measured between MeNB and SeNB.

The accuracy requirements in Table 9.1.20.1-1 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

No changes to the uplink transmission timing are applied during the measurement period.

$RSRP|_{dBm}$ according to Annex B.3.5 for a corresponding Band

**Table 9.1.20.1-1: SFN and subframe time difference measurement accuracy**

| Accuracy | Conditions | | | | |
|---|---|---|---|---|---|
| | Ês/Iot | MIN(PCell downlink transmission Bandwidth, PSCell downlink transmission Bandwidth) | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 6 | Minimum Io | Maximum Io |
| Ts Note 2 | dB | MHz | | dBm/15kHz Note 5 | $dBm/BW_{Channel}$ |
| ±52 | ≥-3 dB | ≥1.4 MHz | FDD_A Note 7, TDD_A | -121 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G Note 4 | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±40 | ≥-3 dB | ≥ 3 MHz | Note 3 | Note 3 | Note 3 |

NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.
NOTE 2: Ts is the basic timing unit defined in TS 36.211.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with downlink bandwidth ≥1.4 MHz.
NOTE 4: Except Band 29.

NOTE 5: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 7: Except Band 32, Band 75, Band 76**.**

### 9.1.20.2 SSTD Measurement Report Mapping

SFN and subframe timing difference (SSTD) measurement report comprises 3 elements:

SFN offset between MeNB and SeNB (ΔX)

Reporting range of ΔX is between frame number # 0 to frame number # 1023 as defined in TS 36.331 [2].

Frame boundary offset between MeNB and SeNB (ΔY)

Reporting range of ΔY is between subfrane number #-5 and subframe number# 4 as defined in TS 36.331 [2].

Subframe boundary offset between MeNB and SeNB (ΔZ)

The reporting range of value of ΔZ is between -1320Ts and +1320Ts with the reporting granularity of 10Ts in the intervals [-1320Ts, -700Ts] and [700Ts, 1320Ts].

The mapping of measured Subframe boundary offset (ΔZ) is defined in Table 9.1.20.2-1.

**Table 9.1.20.2-1: SSTD report mapping**

| Reported Value | Measured Quantity Value | Unit |
|---|---|---|
| SUBFRAME_BOUNDARY_OFFSET_00 | $\Delta Z \le -1320$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_01 | $-1320 < \Delta Z \le -1310$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_02 | $-1310 < \Delta Z \le -1300$ | $T_s$ |
| … | … | … |
| SUBFRAME_BOUNDARY_OFFSET_62 | $-710 < \Delta Z \le -700$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_63 | $-700 < \Delta Z \le 0$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_64 | $0 < \Delta Z \le 700$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_65 | $700 < \Delta Z \le 710$ | $T_s$ |
| … | … | … |
| SUBFRAME_BOUNDARY_OFFSET_125 | $1300 < \Delta Z \le 1310$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_126 | $1310 < \Delta Z \le 1320$ | $T_s$ |
| SUBFRAME_BOUNDARY_OFFSET_127 | $1320 < \Delta Z$ | $T_s$ |

## 9.1.21 Measurement accuracy for UE category M1

The requirements in this clause are applicable for UE category M1. The requirements in clause 9.1.21.1, 9.1.21.2, 9.1.21.6, 9.1.21.9, 9.1.21.10, 9.1.21.13 and 9.1.21.14 are also applicable for ETU220 propagation condition when *highSpeedMeasGapCE-ModeA* is configured.

### 9.1.21.1 Intra-frequency Absolute RSRP Accuracy for UE category M1 with CE mode A

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell for UE category M1.

The accuracy requirements in Table 9.1.21.1-1 and Table 9.1.21.1-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

For a UE capable RSRP measurement based on RSS [4], provided that RSS configuration *rss-ConfigCarrierInfo* [2] has been indicated by higher layers and measurement conditions as defined in clause 8.13.2.1 are met, the accuracy requirement as specified in Table. 9.1.21.1-3 and Table. 9.1.21.1-4 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.21.1-1 and Table 9.1.21.1-2 shall apply.

**Table 9.1.21.1-1: RSRP Intra frequency absolute accuracy for UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±7 | ±10 | ≥-6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.1-2: RSRP Intra frequency absolute accuracy for UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±7 | ±10 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.1-3: RSS based RSRP Intra frequency absolute accuracy for UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ± 9 | ≥-6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ± 8 | ± 11 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.1-4: RSS based RSRP Intra frequency absolute accuracy for UE category M1 with CE mode A for -HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ± 6 | ± 9 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ± 8 | ± 11 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.21.2 Intra-frequency Relative Accuracy of RSRP for UE category M1 with CE mode A

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency for category M1 UE.

The accuracy requirements in Table 9.1. 21.2-1 and Table 9.1. 21.2-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.2-1: RSRP Intra frequency relative accuracy for UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.2-2: RSRP Intra frequency relative accuracy for UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 2 | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±3 | ±4 | ≥-3 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±4 | ±4 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.21.3 Intra-frequency Absolute RSRP Accuracy for UE category M1 with CE mode B

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell for UE category M1.

The accuracy requirements in Table 9.1.21.3-1 and Table 9.1.21.3-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

For a UE capable of RSRP measurement based on RSS[4], provided that RSS configuration *rss-ConfigCarrierInfo* [2] has been indicated by higher layers and measurement conditions as defined in clause 8.13.3.1 are met, the accuracy requirement as specified in Table. 9.1.21.3-3 and Table. 9.1.21.3-4 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.21.3-1 shall apply.

**Table 9.1.21.3-1: RSRP Intra frequency absolute accuracy for UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | |
|---|---|---|---|
| | | Ês/Iot | Io Note 1 range |

| Normal condition | Extreme condition | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|---|---|---|---|---|---|---|
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±7 | ±10 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD_M1_B, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±9 | ±12 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.3-2: RSRP Intra frequency absolute accuracy for UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±7 | ±10 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD_M1_B, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±9 | ±12 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.3-3: RSS based RSRP Intra frequency absolute accuracy for UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ± 8 | ± 11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ± 6.5 | ± 9.5 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ± 10 | ± 13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD_M1_B, FDD-M1_D, FDD-M1_E, TDD-M1_E, | N/A | -70 | -50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ± 8.5 | ± 11.5 | ≥-12 dB | FDD-M1_F, FDD-M1_G, FDD-M1_N | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.3-4: RSS based RSRP Intra frequency absolute accuracy for UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | Io Note 1 range | | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ± 8 | ± 11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ± 6.5 | ± 9.5 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ± 10 | ± 13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD_M1_B, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ± 8.5 | ± 11.5 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.21.4 Intra-frequency Relative Accuracy of RSRP for UE category M1 with CE mode B

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency for category M1 UE.

The accuracy requirements in Table 9.1.21.4-1 and Table 9.1.21.4-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.4-1: RSRP Intra frequency relative accuracy for UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 2 | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±4 | ±4 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.4-2: RSRP Intra frequency relative accuracy for UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±4 | ±4 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.21.5 RSRP Measurement Report Mapping

The reporting range of RSRP is the same as defined in section 9.1.4.

### 9.1.21.6 Intra-frequency Absolute Accuracy of RSRQ for UE category M1 with CE mode A

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Tables 9.1.21.6-1 and 9.1.21.6-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.21.6-1: RSRQ Intra frequency absolute accuracy UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.6-2: RSRQ Intra frequency absolute accuracy UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.21.7 Intra-frequency Absolute Accuracy of RSRQ for UE category M1 with CE mode B

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell.

The accuracy requirements in Tables 9.1.21.7-1 and 9.1.21.7-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.21.7-1: RSRQ Intra frequency absolute accuracy UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±5 | ±6.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.21.7-2: RSRQ Intra frequency absolute accuracy UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±5 | ±6.5 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.8 RSRQ Measurement Report Mapping

The reporting range of RSRQ is the same as defined in section 9.1.7.

## 9.1.21.9 Inter-frequency Absolute RSRP Accuracy for UE category M1 with CE mode A

The requirements for absolute accuracy of RSRP in this clause apply to a cell on another frequency than that of the serving cell for UE category M1.

The accuracy requirements in Table 9.1.21.9-1 and Table 9.1.21.9-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.9-1: RSRP Inter frequency absolute accuracy for UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| | | | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±7 | ±10 | ≥-6 dB | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.9-2: RSRP Inter frequency absolute accuracy for UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±7 | ±10 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±9 | ±12 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.21.10 Inter-frequency Relative Accuracy of RSRP for UE category M1 with CE mode A

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on another frequency for category M1 UE.

The accuracy requirements in Table 9.1.21.10-1 and Table 9.1.21.10-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.10-1: RSRP Inter frequency relative accuracy for UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| | | | FDD-M1_A, TDD-M1_A | -121 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±7 | ±8 | ≥-3 dB | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±8 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.21.10-2: RSRP Inter frequency relative accuracy for UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±7 | ±8 | ≥-3 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±8 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.11 Inter-frequency Absolute RSRP Accuracy for UE category M1 with CE mode B

The requirements for absolute accuracy of RSRP in this clause apply to a cell on another frequency than that of the serving cell for UE category M1.

The accuracy requirements in Table 9.1.21.11-1 and Table 9.1.21.11-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.11-1: RSRP Inter frequency absolute accuracy for UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±7 | ±10 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±9 | ±12 | ≥-12 dB | | | | |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.11-2: RSRP Inter frequency absolute accuracy for UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 / dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 / N/A | -70 |
| | | | FDD-M1_B | -120.5 / N/A | -70 |
| | | | FDD-M1_D | -119.5 / N/A | -70 |
| | | | FDD-M1_E | -119 / N/A | -70 |
| | | | FDD-M1_F | -118.5 / N/A | -70 |
| ±7 | ±10 | ≥-12 dB | FDD-M1_G | -118 / N/A | -70 |
| | | | FDD-M1_N | -114.5 / N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A / -70 | -50 |
| ±9 | ±12 | ≥-12 dB | | | |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.12 Inter-frequency Relative Accuracy of RSRP for UE category M1 with CE mode B

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on another frequency for category M1 UE.

The accuracy requirements in Table 9.1.21.12-1 and Table 9.1.21.12-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.12-1: RSRP Inter frequency relative accuracy for UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |

| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
|---|---|---|---|---|---|
| ±7 | ±10 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.12-2: RSRP Inter frequency relative accuracy for UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±7 | ±10 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.21.13 Inter-frequency Absolute Accuracy of RSRQ for UE category M1 in CE mode A

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Tables 9.1.21.13-1 and 9.1.21.13-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.21.13-1: RSRQ Inter frequency absolute accuracy UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |

| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
|---|---|---|---|---|---|
| ±4 | ±5.5 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.21.13-2: RSRQ Inter frequency absolute accuracy UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±4 | ±5.5 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5.5 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.14 Inter-frequency Relative Accuracy of RSRQ for UE category M1 in CE mode A

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Tables 9.1.21.14-1 and 9.1.21.14-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1 \right|_{dBm} - RSRP2 \left|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.21.14-1: RSRQ Inter frequency relative accuracy UE category M1 with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |

| | | | | | |
|---|---|---|---|---|---|
| ±4.5 | ±5.5 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5.5 | ±5.5 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.21.14-2: RSRQ Inter frequency relative accuracy UE category M1 with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±4.5 | ±5.5 | ≥-3 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5.5 | ±5.5 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.21.15 Inter-frequency Absolute Accuracy of RSRQ for UE category M1 in CE mode B

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell.

The accuracy requirements in Tables 9.1.21.15-1 and 9.1.21.15-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.21.15-1: RSRQ Inter frequency absolute accuracy UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±5 | ±6.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.21.15-2: RSRQ Inter frequency absolute accuracy UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±5 | ±6.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.16 Inter-frequency Relative Accuracy of RSRQ for UE category M1 in CE mode B

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Tables 9.1.21.16-1 and 9.1.21.16-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1|_{dBm} - RSRP2|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.21.16-1: RSRQ Inter frequency relative accuracy UE category M1 with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |

| | | | | | |
|---|---|---|---|---|---|
| ±5.5 | ±6.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6.5 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.21.16-2: RSRQ Inter frequency relative accuracy UE category M1 with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 2 | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±5.5 | ±6.5 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6.5 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.21.17 Inter-Frequency RSTD Accuracy Requirement for UE catergory M1 in CE mode A

The accuracy requirements in Table 9.1.21.17-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.31 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.21.17-1: RSTD measurement accuracy for CEModeA**

| Accuracy | Conditions | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Io Note 4 range | | |
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel | Minimum number of available measurement subframes among the | The number of consecutive downlink subframes $N_{PRS}$ among the reference cell | E-UTRA operating band groups Note 5 | Minimum Io Note 1 | Maximum Io |

| | | bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* | reference cell and the measured neighbour cell *i* | and the measured neighbour cell *i* as defined in [24] | | | |
|---|---|---|---|---|---|---|---|
| **Ts** Note 2 | **dB** | **RB** | | | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| ±21 | (PRS Ês/Iot)$_{ref}$ ≥-6dB and (PRS Ês/Iot)$_i$ ≥-13dB | ≥ 6 | ≥ 12 | ≥4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.21.18 Inter-Frequency RSTD Accuracy Requirement for UE catergory M1 in CE mode B

The accuracy requirements in Table 9.1.21.18-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP 1,2|$_{dBm}$ according to Annex B.3.31 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.21.18-1: RSTD measurement accuracy for CEModeB**

| **Accuracy** | **Conditions** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **PRS Ês/Iot** | **Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the** | **Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*** | **The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24]** | **Io** Note 4 **range** | | |
| | | | | | **E-UTRA operating band groups** Note 5 | **Minimum Io** Note 1 | **Maximum Io** |

| | | measured neighbour cell *i* | | | | | |
|---|---|---|---|---|---|---|---|
| **Ts** [Note 2] | **dB** | **RB** | | | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| [±21] | (PRS Ês/Iot)$_{ref}$ ≥-15dB and (PRS Ês/Iot)$_i$ ≥-15dB | ≥ 6 | ≥ 30 | ≥ 4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.21.19 UE RX-TX time difference Accuracy Requirement for Cat-M1

The UE RX-TX time difference is measured from the PCell.

The accuracy requirements in Table 9.1.21.19-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

No changes to the uplink transmission timing are applied during the measurement period.

RSRP$|_{dBm}$ according to Annex B.2.14 for a corresponding Band

**Table 9.1.21.19-1: UE Rx – Tx time difference measurement accuracy for CEModeA**

| **Accuracy** | **Conditions** | | | | |
|---|---|---|---|---|---|
| | **Ês/Iot** | **Downlink transmission bandwidth of PCell** | **Io [Note 1] range** | | |
| | | | **E-UTRA operating band groups [Note 3]** | **Minimum Io** | **Maximum Io** |
| **Ts [Note 2]** | **dB** | **RB** | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| ±20 | ≥-3 dB | ≥ 6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_H | -117.5 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |

NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.
NOTE 2: Ts is the basic timing unit defined in TS 36.211.

NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.21.20 Intra-Frequency RSTD Accuracy Requirement for UE catergory M1 in CE mode A

The accuracy requirements in Table 9.1.21.20-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.33 for a corresponding Band

For a UE that does not need a measurement gap for intra-frequency RSTD measurement, there are no measurement gaps overlapping with the PRS subframes of the measured serving cell and PRS are available within the UE measurement bandwidth in all PRS subframes

For a UE that needs a measurement gap for intra-frequency RSTD measurement, the measurement gaps are configured to contain PRS subframes

The parameter *expectedRSTDUncertainty* signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 µs.

**Table 9.1.21.20-1: RSTD measurement accuracy for CEModeA**

| Accuracy | Conditions | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Io Note 5 range | | |
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* Note 4 | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24] | E-UTRA operating band groups Note 6 | Minimum Io Note 1 | Maximum Io |
| Ts Note 2 | dB | RB | | | | dBm/15kHz | $dBm/BW_{Channel}$ |
| ±15 Note7 | (PRS Ês/Iot)$_{ref}$ ≥-6dB and (PRS Ês/Iot)$_i$ ≥-13dB | ≥ 6 | ≥ 12 | ≥6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±15 Note8 | (PRS Ês/Iot)$_{ref}$ ≥-6dB and | ≥ 6 | ≥ 12 | ≥4 | FDD-M1_A, TDD-M1_A | -121 | -50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (PRS Ês/Iot)$_i$ ≥-13dB | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 7: The requirement applies when PRS are available within the UE measurement bandwidth in all PRS subframes and measurement gaps are not required.
NOTE 8: The requirement applies when measurement gaps are required.

## 9.1.21.21 Intra-Frequency RSTD Accuracy Requirement for UE catergory M1 in CE mode B

The accuracy requirements in Table 9.1.21.21-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.33 for a corresponding Band

For a UE that does not need a measurement gap for intra-frequency RSTD measurement, there are no measurement gaps overlapping with the PRS subframes of the measured serving cell and PRS are available within the UE measurement bandwidth in all PRS subframes

For a UE that needs a measurement gap for intra-frequency RSTD measurement, the measurement gaps are configured to contain PRS subframes

The parameter *expectedRSTDUncertainty* signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.21.21-1: RSTD measurement accuracy for CEModeB**

| **Accuracy** | **Conditions** | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | **Io Note 5 range** | | |
| | **PRS Ês/Iot** | **Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* Note 4** | **Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*** | **The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24]** | **E-UTRA operating band groups Note 6** | **Minimum Io Note 1** | **Maximum Io** |

| Ts Note 2 | dB | RB | | | | dBm/15kHz | dBm/BW$_{Channel}$ |
|---|---|---|---|---|---|---|---|
| ±15 Note7 | (PRS $\hat{E}s/Iot)_{ref}$ ≥-6dB and (PRS $\hat{E}s/Iot)_i$ ≥-13dB | ≥ 6 | ≥ 30 | ≥6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±15 Note8 | (PRS $\hat{E}s/Iot)_{ref}$ ≥-6dB and (PRS $\hat{E}s/Iot)_i$ ≥-13dB | ≥ 6 | ≥ 30 | ≥4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 7: The requirement applies when PRS are available within the UE measurement bandwidth in all PRS subframes and measurement gaps are not required.
NOTE 8: The requirement applies when measurement gaps are required.

## 9.1.21.22 Downlink Channel Report Mapping for UE Category M1

**Table 9.1.21.22-1: Downlink channel quality measurement report mapping when the Downlink Channel Quality Report (DCQR) MAC Control Element is supported [7]**

| Codepoint/Index | MPDCCH repetition level | MPDCCH aggregation level | Applicable CE Mode |
|---|---|---|---|
| 0000 | No measurement reporting | No measurement reporting | A, B |
| 0001 | 1 | 1 | A |
| 0010 | 1 | 2 | A |
| 0011 | 1 | 4 | A |
| 0100 | 1 | 8 | A |
| 0101 | 1 | 16 | A |
| 0110 | 1 | 24 | A, B |
| 0111 | 2 | 24 | A, B |
| 1000 | 4 | 24 | A, B |
| 1001 | 8 | 24 | A, B |
| 1010 | 16 | 24 | A, B |
| 1011 | 32 | 24 | A, B |
| 1100 | 64 | 24 | A, B |
| 1101 | 128 | 24 | A, B |
| 1110 | 256 | 24 | A, B |

The MPDCCH repetition level for Short Downlink Channel Quality Report (DCQR) MAC Control Element is chosen with regard to the signalled parameter $R_{max}$, the maximum number of repetitions for MPDCCH common search space for random access response (mpdcch-NumRepetition-RA) in SystemInformationBlockType2. The report mapping is defined in Table 9.1.21.22-2.

**Table 9.1.21.22-2: Downlink channel quality measurement report mapping when Short Downlink Channel Quality Report (DCQR) MAC Control Element is supported [7]**

| Reported value | MPDCCH repetition level |
|---|---|
| No short DCQR | No measurement reporting |
| Short DCQR 1 | $R_{max}$/8 (Note 1) |
| Short DCQR 2 | $R_{max}$ (Note 3) |
| Short DCQR 3 | 4x$R_{max}$ (Note 2) |
| Note 1: When $R_{max}$ is less than 8, set Short DCQR 1 to 1.<br>Note 2: When $R_{max}$ is more than 32, set Short DCQR 3 to 256.<br>Note 3: When $R_{max}$ is 1, set Short DCQR 2 to 2.<br>Note 4: Aggregation level (ECCE) is assumed to be $L'_{max}$ = 24. | |

## 9.1.21.23 Downlink Channel Quality Measurement Accuracy for UE Category M1 with CE Mode A

The requirements for accuracy of downlink channel quality reporting in this clause apply only to the serving cell on the anchor carrier for UE Category M1.

The accuracy requirements in Table 9.1.21.23-1, Table 9.1.21.23-2, Table 9.1.21.23-3, and Table 9.1.21.23-4 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.23-1: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for FDD and TDD**

| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io [Note 1] range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| | | dB | | dBm/15kHz | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| R [NOTE 1] | ≤1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| R/4 [NOTE 1] | >1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in DCQR MAC CE or Short DCQR MAC CE.<br>NOTE 2: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.23-2: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for HD-FDD**

| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io [Note 1] range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| | | dB | | dBm/15kHz | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| R [NOTE 1] | ≤1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| R/4 [NOTE 1] | >1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in DCQR MAC CE or Short DCQR MAC CE..<br>NOTE 2: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.23-3: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for FDD and TDD**

| MPDCCH Aggregation level | Pm-Dsg (%) | Ês/Iot | Io [Note 1] range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| | | dB | | dBm/15kHz | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| $L_k$ [NOTE 1] | ≤1 | ≥ -3 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| $L_{k-2}$ NOTE 1 | >1 | ≥ -3 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: $L_k \in \{1,2,4,8,16,24\}$ is the reported MPDCCH aggregation level that UE has reported in DCQR MAC CE where k is the index to the aggregation level set and 1 ≤ k ≤ 6. | | | | | | |
| NOTE 2: Io is assumed to have constant EPRE across the bandwidth. | | | | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.23-4: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for HD-FDD**

| MPDCCH Aggregation level | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
|---|---|---|---|---|---|---|
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| | | dB | | dBm/15kHz | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| $L_k$ NOTE 1 | ≤1 | ≥ -3 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| $L_{k-2}$ NOTE 1 | >1 | ≥ -3 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: $L_k \in \{1,2,4,8,16,24\}$ is the reported MPDCCH aggregation level that UE has reported in DCQR MAC CE where k is the index to the aggregation level set and 1 ≤ k ≤ 6. | | | | | | |
| NOTE 2: Io is assumed to have constant EPRE across the bandwidth. | | | | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.21.24 Downlink Channel Quality Measurement Accuracy for UE Category M1 with CE Mode B

The requirements for accuracy of downlink channel quality reporting in this clause apply only to the serving cell on the anchor carrier for UE Category M1.

The accuracy requirements in Table 9.1.21.24-1 and Table 9.1.21.24-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.21.24-1: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode B for FDD and TDD**

| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | |
|---|---|---|---|---|---|
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |

| | | dB | | dBm/15kHz | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
|---|---|---|---|---|---|---|
| R NOTE 1 | ≤1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| R/8] NOTE 1 | >1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in DCQR MAC CE or Short DCQR MAC CE.<br>NOTE 2: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.21.24-2: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode B for HD-FDD**

| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io NOTE 1 range | | |
|---|---|---|---|---|---|
| | | | E-UTRA operating band groups NOTE 3 | Minimum Io | Maximum Io |
| | | dB | | dBm/15kHz | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| R NOTE 1 | ≤1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| R/8 NOTE 1 | >1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_B | -120.5 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in DCQR MAC CE or Short DCQR MAC CE.<br>NOTE 2: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.22 Measurement accuracy for UE Category NB1

### 9.1.22.1 Intra-frequency Absolute NRSRP Accuracy for UE Category NB1

The requirements for absolute accuracy of NRSRP in this clause apply to a cell on the same frequency as that of the serving cell for UE Category NB1 for stand-alone, guard-band and in-band deployments. For a UE capable of NSSS-based RRM measurement, provided that *nsss-NumOccDiffPrecoders* value *n1* has been indicated by higher layers, the accuracy requirement as specified in Table. 9.1.22.1-2 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.22.1-1 shall apply.

The accuracy requirements in Table 9.1.22.1-1 and Table 9.1.22.1-2 are valid under the following conditions:

Narrowband reference signals are transmitted either from one or two ports.

Conditions defined in Clause 7.3 of TS 36.101 [5] for reference sensitivity are fulfilled.

NRSRP|dBm according to Annex B.3.25 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for NRSRP measurement assuming measured cell is identified cell.

**Table 9.1.22.1-1: NRSRP Intra frequency absolute accuracy for UE Category NB1**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA/NR operating band groups [Note 2] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±6 | ±9 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±10.3 | ±13.3 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | - 122.9 | N/A | -70 |
| ±12.3 | ±15.3 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.22.1-2: NRSRP Intra frequency absolute accuracy for UE Category NB1 under NSSS-based measurement**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA/NR operating band groups [Note 2] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4 | ±7 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±6 | ±9 | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±6 | ±9 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±8 | ±11 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5 | | | | | | |

## 9.1.22.2 Void

## 9.1.22.3 Intra-frequency Absolute NRSRQ Accuracy for UE Category NB1

The requirements for absolute accuracy of NRSRQ in this clause apply to a cell on the same frequency as that of the serving cell for NB-IoT UE for stand-alone, guard-band and in-band deployments. For a UE capable of NSSS-based RRM measurement, provided that *nsss-NumOccDiffPrecoders* value *n1* has been indicated by higher layers, the accuracy requirement as specified in Table. 9.1.22.3-2 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.22.3-1 shall apply.

The accuracy requirements in Table 9.1.22.3-1 and Table 9.1.22.3-2 are valid under the following conditions:

Narrowband reference signals are transmitted either from one or two antenna ports.

Conditions defined in Clause 7.3 of TS 36.101 [5] for reference sensitivity are fulfilled.

NRSRP|dBm according to Annex B.3.25 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for NRSRQ measurement assuming measured cell is identified cell.

**Table 9.1.22.3-1: NRSRQ Intra frequency absolute accuracy for UE Category NB1**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | |
| | | | E-UTRA/NR operating band groups [Note 3] | Minimum Io | Maximum Io |

| dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ |
|---|---|---|---|---|---|
| ±5.2 | ±8.2 | ≥-3 dB | NFDD_G, NTDD_G | -122.9 | -50 |
| ±7.2 | ±10.2 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| ±9.5 | ±12.5 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | -50 |
| ±11.5 | ±14.5 | -15≤Ês/Iot≤--6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: E-UTRA/NR operating band groups are as defined in Section 3.5.

**Table 9.1.22.3-2: NRSRQ Intra frequency absolute accuracy for UE Category NB1 under NSSS-based measurement**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA/NR operating band groups Note 2 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±3.2 | ±6.2 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±5.2 | ±8.2 | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±5.2 | ±8.2 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±7.2 | ±10.2 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5.

### 9.1.22.4 Void

### 9.1.22.5 Inter-frequency Absolute NRSRP Accuracy for UE Category NB1

The requirements for absolute accuracy of NRSRP in this clause apply to a cell that has different carrier frequency from the serving cell. For a UE capable of NSSS-based RRM measurement, provided that *nsss-NumOccDiffPrecoders* value *n1* has been indicated by higher layers, the accuracy requirement as specified in Table. 9.1.22.5-2 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.22.5-1 shall apply.

The accuracy requirements in Table 9.1.22.5-1 and Table 9.1.22.5-2 are valid under the following conditions:

Narrowband reference signals are transmitted either from one or two antenna ports.

Conditions defined in Clause 7.3 of TS 36.101 [5] for reference sensitivity are fulfilled.

NRSRP|dBm according to Annex B.3.26 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for NRSRP measurement assuming measured cell is identified cell.

**Table 9.1.22.5-1: NRSRP Inter frequency absolute accuracy for UE Category NB1**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA/NR operating band groups Note 2 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±9 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±10.3 | ±13.3 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±12.3 | ±15.3 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.22.5-2: NRSRP Inter frequency absolute accuracy for UE Category NB1 under NSSS-based measurement**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA/NR operating band groups Note 2 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4 | ±7 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±6 | ±9 | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±6 | ±9 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±8 | ±11 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | | |

### 9.1.22.6 Void

### 9.1.22.7 Inter-frequency Absolute NRSRQ Accuracy for UE Category NB1

The requirements for absolute accuracy of NRSRQ in this clause apply to a cell that has different carrier frequency from the serving cell. For a UE capable of NSSS-based RRM measurement, provided that *nsss-NumOccDiffPrecoders* value *n1* has been indicated by higher layers, the accuracy requirement as specified in Table. 9.1.22.7-2 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.22.7-1 shall apply.

The accuracy requirements in Table 9.1.22.7-1 and Table 9.1.22.7-2 are valid under the following conditions:

Narrowband reference signals are transmitted either from one or two antenna ports.

Conditions defined in Clause 7.3 of TS 36.101 [5] for reference sensitivity are fulfilled.

NRSRP|dBm according to Annex B.3.26 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for NRSRQ measurement assuming measured cell is identified cell.

**Table 9.1.22.7-1: NRSRQ Inter frequency absolute accuracy for UE Category NB1**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA/NR operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz | dBm/BW$_{Channel}$ |
| ±5.2 | ±8.2 | ≥-3 dB | NFDD_G, NTDD_G | -122.9 | -50 |
| ±7.2 | ±10.2 | ≥-6 dB | Note 2 | Note 2 | Note 2 |
| ±9.5 | ±12.5 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | -50 |
| ±11.5 | ±14.5 | -15≤Ês/Iot≤--6 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.22.7-2: NRSRQ Inter frequency absolute accuracy for UE Category NB1 under NSSS-based measurement**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA/NR operating band groups [Note 2] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±3.2 | ±6.2 | ≥-6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±5.2 | ±8.2] | ≥-6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| ±5.2 | ±8.2 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | -122.9 | N/A | -70 |
| ±7.2 | ±10.2 | -15≤Ês/Iot≤--6 dB | NFDD_G, NTDD_G | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.22.8 Void

## 9.1.22.9 NRSRP Measurement Report Mapping

The reporting range of NRSRP is defined from -156 dBm to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 9.1.22.9-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.22.9-1: NRSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| NRSRP_00 | NRSRP < -156 | dBm |
| NRSRP_01 | -156 ≤ NRSRP < -155 | dBm |
| NRSRP_02 | -155 ≤ NRSRP < -154 | dBm |
| … | … | … |
| NRSRP_111 | -46 ≤ NRSRP < -45 | dBm |
| NRSRP_112 | -45 ≤ NRSRP < -44 | dBm |
| NRSRP_113 | -44 ≤ NRSRP | dBm |

## 9.1.22.10 Intra-Frequency RSTD Accuracy Requirement for NB1 for normal coverage

The accuracy requirements in Table 9.1.22.10-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

NPRP $1,2|_{dBm}$ according to Annex B.3.29 for a corresponding Band

There are no measurement gaps overlapping with the NPRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 µs.

UE is configured via LPP with nprsInfo-Type2 as specified in TS 36.355 [24] for any cell whose NPRS RE overlaps with the NPRS RE of any other cell in the OTDOA assistance data on the same frequency.

**Table 9.1.22.10-1: Intra RSTD measurement accuracy for normal coverage**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | NPRS Ês/Iot | UE NPRS measurement bandwidth on the reference cell and the | Minimum number of available measurement subframes among the reference cell | Io [Note 7] range | | |
| | | | | E-UTRA/NR operating band groups [Note 7] | Minimum Io [Note 1] | Maximum Io |

| | | measured neighbour cell *i* Note 3 | and the measured neighbour cell *i*, $N_{NPRS_total}$ Note 6 | | | |
|---|---|---|---|---|---|---|
| **Ts** Note 2 | **dB** | **RB** | | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| ±20 | (NPRS Ês/Iot)$_{ref}$ ≥-6dB and (NPRS Ês/Iot)$_i$ ≥-13dB | 1 | 320 | NFDD_G, NTDD_G | -118 | -70 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 4: The Io is defined in NPRS positioning subframes. The same Io range applies to NPRS and non-NPRS symbols. Io levels are different in NPRS and non-NPRS symbols within the same subframe.
NOTE 5: E-UTRA/NR operating band groups are as defined in Section 3.5.
NOTE 6: $N_{NPRS_total}$ can be in one or more NPRS positioning occasions.

### 9.1.22.11 Inter-Frequency RSTD Accuracy Requirement for NB1 for normal coverage

The accuracy requirements in Table 9.1.22.11-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

NPRP $1,2|_{dBm}$ according to Annex B.3.29 for a corresponding Band

There are no measurement gaps overlapping with the NPRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

UE is configured via LPP with nprsInfo-Type2 as specified in TS 36.355 [24] for any cell whose NPRS RE overlaps with the NPRS RE of any other cell in the OTDOA assistance data on the same frequency.

**Table 9.1.22.11-1: Inter RSTD measurement accuracy for normal coverage**

| **Accuracy** | **Conditions** | | | | | |
|---|---|---|---|---|---|---|
| | | | | **Io** Note 7 **range** | | |
| | **NPRS Ês/Iot** | **UE NPRS measurement bandwidth on the reference cell and the measured neighbour cell *i*** Note 3 | **Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*, $N_{NPRS_total}$** Note 6 | **E-UTRA/NR operating band groups** Note 7 | **Minimum Io** Note 1 | **Maximum Io** |
| **Ts** Note 2 | **dB** | **RB** | | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| ±28 | (NPRS Ês/Iot)$_{ref}$ ≥-6dB and (NPRS Ês/Iot)$_i$ ≥-13dB | 1 | 320 | NFDD_G, NTDD_G | -118 | -70 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.

NOTE 4: The Io is defined in NPRS positioning subframes. The same Io range applies to NPRS and non-NPRS symbols. Io levels are different in NPRS and non-NPRS symbols within the same subframe.
NOTE 5: E-UTRA/NR operating band groups are as defined in Section 3.5.
NOTE 6: $N_{NPRS_total}$ can be in one or more NPRS positioning occasions.

### 9.1.22.12 Intra-Frequency RSTD Accuracy Requirement for NB1 for enhanced coverage

The accuracy requirements in Table 9.1.22.12-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

NPRP $1,2|_{dBm}$ according to Annex B.3.29 for a corresponding Band

There are no measurement gaps overlapping with the NPRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

UE is configured via LPP with nprsInfo-Type2 as specified in TS 36.355 [24] for any cell whose NPRS RE overlaps with the NPRS RE of any other cell in the OTDOA assistance data on the same frequency.

**Table 9.1.22.12-1: RSTD measurement accuracy for enhanced coverage**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | | | | Io [Note 7] range | | |
| | NPRS Ês/Iot | UE NPRS measurement bandwidth on the reference cell and the measured neighbour cell *i* [Note 3] | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*, $N_{NPRS_total}$ [Note 6] | E-UTRA/NR operating band groups [Note 7] | Minimum Io [Note 1] | Maximum Io |
| Ts [Note 2] | dB | RB | | | dBm/15kHz | $dBm/BW_{Channel}$ |
| ±32 | (NPRS Ês/Iot)$_{ref}$ ≥ -15dB and (NPRS Ês/Iot)$_i$ ≥ -15dB | 1 | 320 | NFDD_G, NTDD_G | -118 | -70 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 4: The Io is defined in NPRS positioning subframes. The same Io range applies to NPRS and non-NPRS symbols. Io levels are different in NPRS and non-NPRS symbols within the same subframe.
NOTE 5: E-UTRA/NR operating band groups are as defined in Section 3.5.
NOTE 6: $N_{NPRS_total}$ can be in one or more NPRS positioning occasions.

### 9.1.22.13 Inter-Frequency RSTD Accuracy Requirement for NB1 for enhanced coverage

The accuracy requirements in Table 9.1.22.13-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

NPRP $1,2|_{dBm}$ according to Annex B.3.29 for a corresponding Band

There are no measurement gaps overlapping with the NPRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

UE is configured via LPP with nprsInfo-Type2 as specified in TS 36.355 [24] for any cell whose NPRS RE overlaps with the NPRS RE of any other cell in the OTDOA assistance data on the same frequency.

**Table 9.1.22.13-1: RSTD measurement accuracy for enhanced coverage**

| Accuracy | Conditions | | | | | |
|---|---|---|---|---|---|---|
| | | | | Io Note 7 range | | |
| | NPRS Ês/Iot | UE NPRS measurement bandwidth on the reference cell and the measured neighbour cell *i* Note 3 | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*, $N_{NPRS_total}$ Note 6 | E-UTRA/NR operating band groups Note 7 | Minimum Io Note 1 | Maximum Io |
| Ts Note 2 | dB | RB | | | dBm/15kHz | dBm/$BW_{Channel}$ |
| ±40 | $(NPRS\ \hat{E}s/Iot)_{ref} \geq -15dB$ and $(NPRS\ \hat{E}s/Iot)_i \geq -15dB$ | 1 | 320 | NFDD_G, NTDD_G | -118 | -70 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 4: The Io is defined in NPRS positioning subframes. The same Io range applies to NPRS and non-NPRS symbols. Io levels are different in NPRS and non-NPRS symbols within the same subframe.
NOTE 5: E-UTRA/NR operating band groups are as defined in Section 3.5.
NOTE 6: $N_{NPRS_total}$ can be in one or more NPRS positioning occasions.

## 9.1.22.14 NRSRQ Measurement Report Mapping

The reporting range of NRSRQ is defined from -34 dB to 2.5 dB with 0.5 dB resolution.

The mapping of measured quantity is defined in table 9.1.22.14-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.1.22.14-1: NRSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| NRSRQ_-30 | NRSRQ < -34 | dB |
| NRSRQ_-29 | -34 ≤ NRSRQ < -33.5 | dB |
| … | … | … |
| NRSRQ_-02 | -20.5 ≤ NRSRQ < -20 | dB |
| NRSRQ_-01 | -20 ≤ NRSRQ < -19.5 | dB |
| NRSRQ_00 | NRSRQ < -19.5 | dB |
| NRSRQ_01 | -19.5 ≤ NRSRQ < -19 | dB |
| NRSRQ_02 | -19 ≤ NRSRQ < -18.5 | dB |
| … | … | … |
| NRSRQ_32 | -4 ≤ NRSRQ < -3.5 | dB |
| NRSRQ_33 | -3.5 ≤ NRSRQ < -3 | dB |
| NRSRQ_34 | -3 ≤ NRSRQ | dB |
| NRSRQ_35 | -3 ≤ NRSRQ < -2.5 | dB |
| NRSRQ_36 | -2.5 ≤ NRSRQ < -2 | dB |
| … | … | … |
| NRSRQ_45 | 2 ≤ NRSRQ < 2.5 | dB |
| NRSRQ_46 | 2.5 ≤ NRSRQ | dB |

### 9.1.22.15 MSG3-based Measurement Report Mapping for UE Category NB1

**Table 9.1.22.15-1: Downlink channel quality measurement report mapping of CQI-NPDCCH-NB when the DL channel quality reporting is supported [7]**

| Reported value | NPDCCH repetition level |
|---|---|
| noMeasurement | No measurement reporting |
| candidateRep-A | 1 |
| candidateRep-B | 2 |
| candidateRep-C | 4 |
| candidateRep-D | 8 |
| candidateRep-E | 16 |
| candidateRep-F | 32 |
| candidateRep-G | 64 |
| candidateRep-H | 128 |
| candidateRep-I | 256 |
| candidateRep-J | 512 |
| candidateRep-K | 1024 |
| candidateRep-L | 2048 |

The NPDCCH repetition level for CQI-NPDCCH-Short-NB is chosen with regard to the signalled parameter $R_{max}$, the maximum number of repetitions for NPDCCH common search space for random access response (npdcch-NumRepetitions-RA) in SystemInformationBlockType2-NB. The report mapping is defined in Table 9.1.22.15-2.

**Table 9.1.22.15-2: Downlink channel quality measurement report mapping of CQI-NPDCCH-Short-NB when the DL channel quality reporting is supported [7]**

| Reported value | NPDCCH repetition level |
|---|---|
| noMeasurements | No measurement reporting |
| candidateRep-1 | $R_{max}$/8 (NOTE 1) |
| candidateRep-2 | $R_{max}$ (NOTE 3) |
| candidateRep-3 | 4×$R_{max}$ (NOTE 2) |
| NOTE 1: When $R_{max}$ is less than 8, set candidateRep-1 to 1.<br>NOTE 2: When $R_{max}$ is more than 512, set candidateRep-3 to 2048.<br>NOTE 3: When $R_{max}$ is 1, set candidateRep-2 to 2. | |

### 9.1.22.16 Downlink Channel Quality Measurement Accuracy for UE Category NB1

The requirements for accuracy of downlink channel quality reporting in this clause apply to the serving cell on the anchor carrier and non-anchor carrier for UE Category NB1.

The accuracy requirements in Table 9.1.22.16-1 are valid under the following conditions:

- Cell specific reference signals are transmitted either from one or two ports.
- Conditions defined in TS 36.101 [5] Clause 7.3 for reference sensitivity are fulfilled.
- NRSRP|dBm according to Annex B.3.25 for a corresponding Band.

**Table 9.1.22.16-1: Downlink channel quality reporting accuracy for UE Category NB1**

| NPDCCH Repetition | Pm-Dsg (%) | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | Ês/Iot | Io NOTE 1 range | | | |
| | | | E-UTRA/NR operating band groups NOTE 2 | Minimum Io | | Maximum Io |
| | | dB | | dBm/15kHz | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| R NOTE 1 | ≤1 | ≥ -6 dB | NFDD_G | -122.9 | N/A | -70 |
| R/4 NOTE 1 | >1 | ≥ -6 dB | NFDD_G | -122.9 | N/A | -70 |
| R NOTE 1 | ≤1 | -15 ≤ Ês/Iot ≤ -6 dB | NFDD_G | - 122.9 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| R/8 NOTE 1 | >1 | -15 ≤ Ês/Iot ≤ -6 dB | NFDD_G | - 122.9 | N/A | -70 |
| NOTE 1: R is the reported NPDCCH repetition level that UE has reported in CQI-NPDCCH-NB or CQI-NPDCCH-Short-NB.<br>NOTE 2: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 3: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.23 Power Headroom for UE Category NB1

The requirements in this clause shall apply for power headroom for UE Category NB1 as defined in [31].

The power headroom provides the serving eNB with information about the differences between the UE configured maximum output power ($P_{CMAX,}$) defined in TS 36.101 [5] and the estimated power for UL-NSCH transmission of the serving cell [3].

**Table 9.1.23 -1: The applicability of power headroom report mapping requirements for different power class UE**

| Power class | Power headroom report mapping |
|---|---|
| PC3 and PC5 | As defined in section 9.1.23.3 |
| PC6 | As defined in section 9.1.23.4 |

### 9.1.23.1 Period

The reported power headroom shall be estimated over 1 slot of NPUSCH transmissions.

### 9.1.23.2 Reporting Delay

The power headroom reporting delay is defined as the time between the beginning of the power headroom reference period and the time when the UE starts transmitting the power headroom over the radio interface. The reporting delay of the power headroom shall be 0 ms, which is applicable for all configured triggering mechanisms for power headroom reporting.

### 9.1.23.3 Report Mapping for UE Category NB1

The power headroom reporting range is from -54 dB to +11 dB (or +19 dB if enhanced PHR is used) for UE category NB1 when the enhanced coverage level 0 is selected during the random access procedure [17]. The report mapping is defined in Table 9.1.23.3-1 for UEs not supporting enhanced PHR, and in Table 9.1.23.3-1A for UEs supporting enhanced PHR [31].

**Table 9.1.23.3-1: Power headroom report mapping for UE category NB1 UEs not supporting enhanced PHR [31] when the enhanced coverage level 0 is selected during random access procedure [17]**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < 5 |
| POWER_HEADROOM_1 | 5 ≤ PH < 8 |
| POWER_HEADROOM_2 | 8 ≤ PH < 11 |
| POWER_HEADROOM_3 | PH ≥ 11 |

**Table 9.1.23.3-1A: Power headroom report mapping for UE category NB1 UEs supporting enhanced PHR [31] when the enhanced coverage level 0 is selected during random access procedure [17]**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < -37 |
| POWER_HEADROOM_1 | -37 ≤ PH < -33 |
| POWER_HEADROOM_2 | -33 ≤ PH < -29 |
| POWER_HEADROOM_3 | -29 ≤ PH < -25 |
| POWER_HEADROOM_4 | -25 ≤ PH < -21 |

| | |
|---|---|
| POWER_HEADROOM_5 | -21 ≤ PH < -17 |
| POWER_HEADROOM_6 | -17 ≤ PH < -13 |
| POWER_HEADROOM_7 | -13 ≤ PH < -9 |
| POWER_HEADROOM_8 | -9 ≤ PH < -5 |
| POWER_HEADROOM_9 | -5 ≤ PH < -1 |
| POWER_HEADROOM_10 | -1 ≤ PH < 3 |
| POWER_HEADROOM_11 | 3≤ PH < 7 |
| POWER_HEADROOM_12 | 7≤ PH < 11 |
| POWER_HEADROOM_13 | 11 ≤ PH < 15 |
| POWER_HEADROOM_14 | 15 ≤ PH < 19 |
| POWER_HEADROOM_15 | PH ≥ 19 |

The power headroom reporting range is from -54 dB to +6 dB or 11 dB if enhanced PHR is used) for UE category NB1 when enhanced coverage level other than 0 is selected during the random access procedure [17]. The report mapping is defined in Table 9.1.23.3-2 for the UEs not supporing enhanced PHR, and in Table 9.1.23.3-2A for UEs supporting enhanced PHR [31].

**Table 9.1.23.3-2: Power headroom report mapping for UE category NB1 UEs not supporting enhanced PHR [31] when the enhanced coverage level other than 0 is selected during random access procedure [17]**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < -10 |
| POWER_HEADROOM_1 | -10 ≤ PH < -2 |
| POWER_HEADROOM_2 | -2 ≤ PH < 6 |
| POWER_HEADROOM_3 | PH ≥ 6 |

**Table 9.1.23.3-2A: Power headroom report mapping for UE category NB1 supporting enhanced PHR [31] when the enhanced coverage level other than 0 is selected during random access procedure [17]**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < -45 |
| POWER_HEADROOM_1 | -45 ≤ PH < -41 |
| POWER_HEADROOM_2 | -41 ≤ PH < -37 |
| POWER_HEADROOM_3 | -37 ≤ PH < -33 |
| POWER_HEADROOM_4 | -33 ≤ PH < -29 |
| POWER_HEADROOM_5 | -29 ≤ PH < -25 |
| POWER_HEADROOM_6 | -25 ≤ PH < -21 |
| POWER_HEADROOM_7 | -21 ≤ PH < -17 |
| POWER_HEADROOM_8 | -17 ≤ PH < -13 |
| POWER_HEADROOM_9 | -13 ≤ PH < -9 |
| POWER_HEADROOM_10 | -9 ≤ PH < -5 |
| POWER_HEADROOM_11 | -5 ≤ PH < -1 |
| POWER_HEADROOM_12 | -1 ≤ PH < 3 |
| POWER_HEADROOM_13 | 3 ≤ PH < 7 |
| POWER_HEADROOM_14 | 7 ≤ PH < 1 |
| POWER_HEADROOM_15 | PH ≥ 11 |

#### 9.1.23.3.1 Void

#### 9.1.23.3.2 Void

### 9.1.23.4 Report Mapping for UE Category NB1 for UE Power Class 6

The power headroom reporting range is -54 dB … +11 dB for UE category NB1 when the enhanced coverage level 0 is selected during the random access procedure [17] for UE power class 6 [5]. The report mapping is defined in Table 9.1.23.4-1 for the UEs not supporting enhanced PHR, and in Table 9.1.23.4-1A for UEs supporting enhanced PHR [31].

**Table 9.1.23.4-1: Power headroom report mapping for UE category NB1 UEs not supporting enhanced PHR when the enhanced coverage level 0 is selected during random access procedure [17] for UE PC6**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < 5 |
| POWER_HEADROOM_1 | 5 ≤ PH < 8 |
| POWER_HEADROOM_2 | 8 ≤ PH < 11 |
| POWER_HEADROOM_3 | PH ≥ 11 |

**Table 9.1.23.4-1A: Power headroom report mapping for UE category NB1 for UE PC6 and supporting enhanced PHR [31] when the enhanced coverage level 0 is selected during random access procedure [17] for UE PC6**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < -45 |
| POWER_HEADROOM_1 | -45 ≤ PH < -41 |
| POWER_HEADROOM_2 | -41 ≤ PH < -37 |
| POWER_HEADROOM_3 | -37 ≤ PH < -33 |
| POWER_HEADROOM_4 | -33 ≤ PH < -29 |
| POWER_HEADROOM_5 | -29 ≤ PH < -25 |
| POWER_HEADROOM_6 | -25 ≤ PH < -21 |
| POWER_HEADROOM_7 | -21 ≤ PH < -17 |
| POWER_HEADROOM_8 | -17 ≤ PH < -13 |
| POWER_HEADROOM_9 | -13 ≤ PH < -9 |
| POWER_HEADROOM_10 | -9 ≤ PH < -5 |
| POWER_HEADROOM_11 | -5 ≤ PH < -1 |
| POWER_HEADROOM_12 | -1 ≤ PH < 3 |
| POWER_HEADROOM_13 | 3 ≤ PH < 7 |
| POWER_HEADROOM_14 | 7 ≤ PH < 11 |
| POWER_HEADROOM_15 | PH ≥ 11 |

The power headroom reporting range is from -54 dB ...0 dB for UE category NB1 when the enhanced coverage level other than 0 is selected during the random access procedure [17] for UE power class of 6 [5]. The report mapping is defined in Table 9.1.23.4-2.

**Table 9.1.23.4-2: Power headroom report mapping for UE category NB1 when the enhanced coverage level other than 0 is selected during random access procedure [17] for UE PC6**

| Reported value | Measured quantity value (dB) |
|---|---|
| POWER_HEADROOM_0 | -54 ≤ PH < -20 |
| POWER_HEADROOM_1 | -20 ≤ PH < -10 |
| POWER_HEADROOM_2 | -10 ≤ PH < 0 |
| POWER_HEADROOM_3 | PH ≥ 0 |

## 9.1.24 Void

## 9.1.25 Measurement accuracy for UE category M2

### 9.1.25.1 Inter-Frequency RSTD Accuracy Requirement for UE catergory M2 in CE mode A

The accuracy requirements in Table 9.1.25.1-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.32 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.25.1-1: RSTD measurement accuracy for CEModeA**

| Accuracy | Conditions | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Io [Note 5] range | | |
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24] | E-UTRA operating band groups [Note 6] | Minimum Io [Note 1] | Maximum Io |
| Ts [Note 2] | dB | RB | | | | dBm/15kHz | dBm/$BW_{Channel}$ |
| ±21 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 6 | ≥ 12 | ≥ 4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±10 | $(PRS\ Ês/Iot)_{ref}$ ≥-6dB and $(PRS\ Ês/Iot)_i$ ≥-13dB | ≥ 24 | ≥ 4 | ≥ 2 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.25.2 Inter-Frequency RSTD Accuracy Requirement for UE catergory M2 in CE mode B

The accuracy requirements in Table 9.1.25.2-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.32 for a corresponding Band

There are no measurement gaps overlapping with the PRS subframes of the measured serving cell.

The parameter expectedRSTDUncertainty signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.25.2-1: RSTD measurement accuracy for CEModeB**

| Accuracy | Conditions |
|---|---|

| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24] | Io [Note 5] range | | |
|---|---|---|---|---|---|---|---|
| | | | | | E-UTRA operating band groups [Note 6] | Minimum Io [Note 1] | Maximum Io |
| Ts [Note 2] | dB | RB | | | | dBm/15kHz | $dBm/BW_{Channel}$ |
| ±21 | $(PRS Ês/Iot)_{ref}$ ≥-15dB and $(PRS Ês/Iot)_i$ ≥-15dB | ≥ 6 | ≥ 30 | ≥ 4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±10 | $(PRS Ês/Iot)_{ref}$ ≥-15dB and $(PRS Ês/Iot)_i$ ≥-15dB | ≥ 24 | ≥ 8 | ≥ 4 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 6: E-UTRA operating band groups are as defined in Section 3.5.

### 9.1.25.3 UE RX-TX time difference Accuracy Requirement for Cat-M2

The UE RX-TX time difference is measured from the PCell.

The accuracy requirements in Table 9.1.25.3-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

No changes to the uplink transmission timing are applied during the measurement period.

$RSRP|_{dBm}$ according to Annex B.2.14 for a corresponding Band

**Table 9.1.25.3-1: UE Rx – Tx time difference measurement accuracy for CEModeA**

| Accuracy | Conditions | | | | |
|---|---|---|---|---|---|
| | Ês/Iot | Downlink transmission bandwidth of PCell | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 4] | Minimum Io | Maximum Io |
| Ts [Note 2] | dB | RB | | dBm/15kHz | $dBm/BW_{Channel}$ |
| ±20 | ≥-3 dB | ≥ 6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_B | -120.5 | -50 |
| | | | FDD-M1_C, TDD-M1_C | -120 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_H | -117.5 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±10 | ≥-3 dB | ≥ 24 | Note 3 | Note 3 | Note 3 |
| NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.<br>NOTE 2: Ts is the basic timing unit defined in TS 36.211.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with downlink bandwidth ≥1.4 MHz.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.25.4 Intra-Frequency RSTD Accuracy Requirement for UE catergory M2 in CE mode A

The accuracy requirements in Table 9.1.25.4-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.34 for a corresponding Band

For a UE that does not need a measurement gap for intra-frequency RSTD measurement, there are no measurement gaps overlapping with the PRS subframes of the measured serving cell and PRS are available within the UE measurement bandwidth in all PRS subframes

For a UE that needs a measurement gap for intra-frequency RSTD measurement, the measurement gaps are configured to contain PRS subframes

The parameter *expectedRSTDUncertainty* signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 μs.

**Table 9.1.25.4-1: RSTD measurement accuracy for CEModeA**

| Accuracy | Conditions | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Io Note 6 range | | |
| | PRS Ês/Iot | Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured neighbour cell *i* Note 5 | Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i* | The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24] | E-UTRA operating band groups Note 7 | Minimum Io Note 1 | Maximum Io |
| Ts Note 2 | dB | RB | | | | dBm/15kHz | $dBm/BW_{Channel}$ |
| ±15 Note8 | $(PRS Ês/Iot)_{ref}$ ≥-6dB and $(PRS Ês/Iot)_i$ ≥-13dB | ≥ 6 | ≥ 12 | ≥ 6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ±15[Note9] | $(PRS \hat{E}s/Iot)_{ref}$ ≥-6dB and $(PRS \hat{E}s/Iot)_i$ ≥-13dB | ≥ 6 | ≥ 12 | ≥4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±6 | $(PRS \hat{E}s/Iot)_{ref}$ ≥-6dB and $(PRS \hat{E}s/Iot)_i$ ≥-13dB | ≥ 24 | ≥ 4 | ≥ 2 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 7: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 8: The requirement applies when PRS are available within the UE measurement bandwidth in all PRS subframes and measurement gaps are not required.
NOTE 9: The requirement applies when measurement gaps are required.

### 9.1.25.5 Intra-Frequency RSTD Accuracy Requirement for UE catergory M2 in CE mode B

The accuracy requirements in Table 9.1.25.5-1 are valid under the following conditions:

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

PRP $1,2|_{dBm}$ according to Annex B.3.34 for a corresponding Band

For a UE that does not need a measurement gap for intra-frequency RSTD measurement, there are no measurement gaps overlapping with the PRS subframes of the measured serving cell and PRS are available within the UE measurement bandwidth in all PRS subframes

For a UE that needs a measurement gap for intra-frequency RSTD measurement, the measurement gaps are configured to contain PRS subframes

The parameter *expectedRSTDUncertainty* signalled over LPP by E-SMLC as defined in TS 36.355 [24] is less than 5 µs.

**Table 9.1.25.5-1: RSTD measurement accuracy for CEModeB**

| **Accuracy** | **Conditions** | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | **Io [Note 6] range** | | |
| | **PRS Ês/Iot** | **Minimum PRS bandwidth, which is minimum of serving cell channel bandwidth and the PRS bandwidths of the reference cell and the measured** | **Minimum number of available measurement subframes among the reference cell and the measured neighbour cell *i*** | **The number of consecutive downlink subframes $N_{PRS}$ among the reference cell and the measured neighbour cell *i* as defined in [24]** | **E-UTRA operating band groups [Note 7]** | **Minimum Io [Note 1]** | **Maximum Io** |

| | | neighbour cell *i* Note 5 | | | | | |
|---|---|---|---|---|---|---|---|
| **Ts Note 2** | **dB** | **RB** | | | | **dBm/15kHz** | **dBm/BW$_{Channel}$** |
| ±15Note8 | (PRS Ês/Iot)$_{ref}$ ≥-15dB and (PRS Ês/Iot)$_i$ ≥-15dB | ≥ 6 | ≥ 30 | ≥ 6 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±15Note9 | (PRS Ês/Iot)$_{ref}$ ≥-15dB and (PRS Ês/Iot)$_i$ ≥-15dB | ≥ 6 | ≥ 30 | ≥ 4 | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | | | FDD-M1_B | -120.5 | -50 |
| | | | | | FDD-M1_C, TDD-M1_C | -120 | -50 |
| | | | | | FDD-M1_D | -119.5 | -50 |
| | | | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | | | FDD-M1_F | -118.5 | -50 |
| | | | | | FDD-M1_G | -118 | -50 |
| | | | | | FDD-M1_H | -117.5 | -50 |
| | | | | | FDD-M1_N | -114.5 | -50 |
| ±6 | (PRS Ês/Iot)$_{ref}$ ≥-15dB and (PRS Ês/Iot)$_i$ ≥-15dB | ≥ 24 | ≥ 8 | ≥ 4 | Note 4 | Note 4 | Note 4 |

NOTE 1: This minimum Io condition is expressed as the average Io per RE over all REs in an OFDM symbol.
NOTE 2: Ts is the basic timing unit defined in TS 36.211 [16].
NOTE 3: PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24].
NOTE 4: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding requirement with the PRS bandwidth ≥ 6 RB.
NOTE 5: The serving cell, the reference cell, and the measured neighbour cell i are on the same carrier frequency.
NOTE 6: The Io is defined in PRS positioning subframes. The same Io range applies to PRS and non-PRS symbols. Io levels are different in PRS and non-PRS symbols within the same subframe.
NOTE 7: E-UTRA operating band groups are as defined in Section 3.5.
NOTE 8: The requirement applies when PRS are available within the UE measurement bandwidth in all PRS subframes and measurement gaps are not required.
NOTE 9: The requirement applies when measurement gaps are required.

## 9.1.26 Measurement Accuracy for non-BL CE UE

The requirements defined in Section 9.1.26 do not apply when the UE is of category 1bis.

### 9.1.26.1 Intra-frequency Absolute Accuracy of RSRP for non-BL CE UE in CE mode A

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell for non-BL CE UE.

The accuracy requirements in Table 9.1.26.1-1 and Table 9.1.26.1-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

For a UE capable RSRP measurement based on RSS [4], provided that RSS configuration *rss-ConfigCarrierInfo* [2] has been indicated by higher layers and measurement conditions as defined in clause 8.13.2.1 are met, the accuracy requirement as specified in Table. 9.1.21.1-3 and Table. 9.1.21.1-4 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.26.1-1 and Table 9.1.26.1-2 shall apply.

**Table 9.1.26.1-1: RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±5.5 | ±8.5 | ≥-6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.26.1-2: RSRP Intra frequency absolute accuracy for non-BL DE UE with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±5.5 | ±8.5 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.26.1-3: RSS based RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±3.5 | ±6.5 | ≥-6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±6 | ±9 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.26.1-4: RSS based RSRP Intra frequency absolute accuracy for non-BL DE UE with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io [Note 1] range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups [Note 3] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| ±3.5 | ±6.5 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±6 | ±9 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.26.2 Intra-frequency Relative Accuracy of RSRP for non-BL CE UE in CE mode A

The same requirement as for UE category M1 in Clause 9.1.21.2 applies.

## 9.1.26.3 Intra-frequency Absolute Accuracy of RSRP for non-BL CE UE in CE mode B

The requirements for absolute accuracy of RSRP in this clause apply to a cell on the same frequency as that of the serving cell for non-BL CE UE.

The accuracy requirements in Table 9.1.26.3-1 and Table 9.1.26.3-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

For a UE capable RSRP measurement based on RSS [4], provided that RSS configuration *rss-ConfigCarrierInfo* [2] has been indicated by higher layers and measurement conditions as defined in clause 8.13.3.1 are met, the accuracy requirement as specified in Table. 9.1.26.3-3 and Table. 9.1.26.3-4 shall apply. Otherwise, the accuracy requirement as specified in Table 9.1.26.3-1 and Table 9.1.26.3-2 shall apply.

**Table 9.1.26.3-1: RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | |
|---|---|---|---|
| | | Ês/Iot | Io [Note 1] range |

| Normal condition | Extreme condition | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|---|---|---|---|---|---|---|
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±6 | ±9 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±8 | ±11 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.3-2: RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | Io Note 1 range | | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±6 | ±9 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±8 | ±11 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.3-3: RSS based RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| | | | Io Note 1 range | | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±9 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±4.5 | ±7.5 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±6.5 | ±9.5 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.

NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.3-3: RSS based RSRP Intra frequency absolute accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±6 | ±9 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±4.5 | ±7.5 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±6.5 | ±9.5 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.4 Intra-frequency Relative Accuracy of RSRP for non-BL CE UE in CE mode B

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on the same frequency for the non-BL CE UE.

The accuracy requirements in Table 9.1.26.4-1 and Table 9.1.26.4-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.26.4-1: RSRP Intra frequency relative accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±3 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.4-2: RSRP Intra frequency relative accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±3 | ±3 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±5 | ±5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.5 RSRP Measurement Report Mapping

The same RSRP reporting range as for UE category M1 in Clause 9.1.21.5 applies.

## 9.1.26.6 Intra-frequency Absolute Accuracy of RSRQ for non-BL CE UE in CE mode A

The same requirement as for UE category M1 in Clause 9.1.21.6 applies.

## 9.1.26.7 Intra-frequency Absolute Accuracy of RSRQ for non-BL CE UE in CE mode B

The requirements for absolute accuracy of RSRQ in this clause apply to a cell on the same frequency as that of the serving cell for the non-BL CE UE.

The accuracy requirements in Tables 9.1.26.7-1 and 9.1.26.7-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

**Table 9.1.26.7-1: RSRQ Intra frequency absolute accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±4 | ±5.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.7-2: RSRQ Intra frequency absolute accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±4 | ±5.5 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.8 RSRQ Measurement Report Mapping

The same RSRQ reporting range as for UE category M1 in Clause 9.1.21.8 applies.

## 9.1.26.9 Inter-frequency Absolute Accuracy of RSRP for non-BL CE UE in CE mode A

The requirements for absolute accuracy of RSRP in this clause apply to a cell on another frequency than that of the serving cell for non-BL CE UE.

The accuracy requirements in Table 9.1.26.9-1 and Table 9.1.26.9-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.26.9-1: RSRP Inter frequency absolute accuracy for non-BL CE UE with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±5.5 | ±8.5 | ≥-6 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±8 | ±11 | ≥-6 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

**Table 9.1.26.9-2: RSRP Inter frequency absolute accuracy for non-BL CE UE with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±5.5 | ±8.5 | ≥-6 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| | | | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

## 9.1.26.10 Inter-frequency Relative Accuracy of RSRP for non-BL CE UE in CE mode A

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on another frequency for the non-BL CE UE.

The accuracy requirements in Table 9.1.26.10-1 and Table 9.1.26.10-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP1,2$|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.26.10-1: RSRP Inter frequency relative accuracy for non-BL CE UE with CE mode A for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±5.5 | ±6.5 | ≥-3 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6.5 | ±6.5 | ≥-6 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | | | | |

NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.10-2: RSRP Inter frequency relative accuracy for non-BL CE UE with CE mode A for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±5.5 | ±6.5 | ≥-3 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6.5 | ±6.5 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.11 Inter-frequency Absolute Accuracy of RSRP for non-BL CE UE in CE mode B

The requirements for absolute accuracy of RSRP in this clause apply to a cell on another frequency than that of the serving cell for the non-BL UE.

The accuracy requirements in Table 9.1.26.11-1 and Table 9.1.26.11-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.26.11-1: RSRP Inter frequency absolute accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | | |
| | | | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E, TDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±6 | ±9 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, TDD-M1_A, FDD-M1_D, FDD-M1_E, TDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±8 | ±11 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.11-2: RSRP Inter frequency absolute accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io [Note 1] range | | | |
| | | | E-UTRA operating band groups [Note 3] | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 2] | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | FDD-M1_A | -121 | N/A | -70 |
| | | | FDD-M1_D | -119.5 | N/A | -70 |
| | | | FDD-M1_E | -119 | N/A | -70 |
| | | | FDD-M1_F | -118.5 | N/A | -70 |
| ±6 | ±9 | ≥-12 dB | FDD-M1_G | -118 | N/A | -70 |
| | | | FDD-M1_N | -114.5 | N/A | -70 |
| ±10 | ±13 | -15≤Ês/Iot≤-12 dB | FDD-M1_A, FDD-M1_D, FDD-M1_E, FDD-M1_F, FDD-M1_G, FDD-M1_N | N/A | -70 | -50 |
| ±8 | ±11 | ≥-12 dB | | | | |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.12 Inter-frequency Relative Accuracy of RSRP for non-BL CE UE in CE mode B

The relative accuracy of RSRP is defined as the RSRP measured from one cell compared to the RSRP measured from another cell on another frequency.

The accuracy requirements in Table 9.1.26.12-1 and Table 9.1.26.12-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.8 for a corresponding Band.

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

**Table 9.1.26.12-1: RSRP Inter frequency relative accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot [Note 2] | Io [Note 1] range | | |
| | | | E-UTRA operating band groups [Note 5] | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz [Note 4] | $dBm/BW_{Channel}$ |
| ±6 | ±9 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.

NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table 9.1.26.12-2: RSRP Inter frequency relative accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±6 | ±9 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±8 | ±11 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA operating band groups are as defined in Section 3.5.

## 9.1.26.13 Inter-frequency Absolute Accuracy of RSRQ for non-BL CE UE in CE mode A

The same requirement as for UE category M1 in Clause 9.1.21.13 applies.

## 9.1.26.14 Inter-frequency Relative Accuracy of RSRQ for non-BL CE UE in CE mode A

The same requirement as for UE category M1 in Clause 9.1.21.14 applies.

## 9.1.26.15 Inter-frequency Absolute Accuracy of RSRQ for non-BL CE UE in CE mode B

The requirements for absolute accuracy of RSRQ in this clause apply to a cell that has different carrier frequency from the serving cell for the non-BL CE UE.

The accuracy requirements in Tables 9.1.26.15-1 and 9.1.26.15-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.3 for a corresponding Band

**Table 9.1.26.15-1: RSRQ Inter frequency absolute accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±4 | ±5.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.26.15-2: RSRQ Inter frequency absolute accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | $dBm/BW_{Channel}$ |
| ±4 | ±5.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 2 | Note 2 | Note 2 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.26.16 Inter-frequency Relative Accuracy of RSRQ for non-BL CE UE in CE mode B

The relative accuracy of RSRQ in inter frequency case is defined as the RSRQ measured from one cell compared to the RSRQ measured from another cell on a different frequency.

The accuracy requirements in Tables 9.1.26.16-1 and 9.1.26.16-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

$RSRP1,2|_{dBm}$ according to Annex B.3.4 for a corresponding Band

$$\left| RSRP1 \right|_{dBm} - RSRP2 \left|_{dBm} \right| \leq 27dB$$

| Channel 1_Io -Channel 2_Io | ≤ 20 dB

**Table 9.1.26.16-1: RSRQ Inter frequency relative accuracy for non-BL CE UE with CE mode B for FDD and TDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±4.5 | ±5.5 | ≥-12 dB | FDD-M1_A, TDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E, TDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |

| | | | | | |
|---|---|---|---|---|---|
| ±6.5 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table 9.1.26.16-2: RSRQ Inter frequency relative accuracy for non-BL CE UE with CE mode B for HD-FDD**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2 | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | $dBm/BW_{Channel}$ |
| ±4.5 | ±5.5 | ≥-12 dB | FDD-M1_A | -121 | -50 |
| | | | FDD-M1_D | -119.5 | -50 |
| | | | FDD-M1_E | -119 | -50 |
| | | | FDD-M1_F | -118.5 | -50 |
| | | | FDD-M1_G | -118 | -50 |
| | | | FDD-M1_N | -114.5 | -50 |
| ±6.5 | ±6.5 | -15≤Ês/Iot≤-12 dB | Note 3 | Note 3 | Note 3 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies.<br>NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.<br>NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## 9.1.27 SFN and frame Timing Difference (SFTD)

### 9.1.27.1 SFTD Accuracy Requirement

The SFN and frame timing difference (SFTD) is measured between PCell and NR PSCell under EN-DC, or between PCell and NR cell for inter-RAT SFTD. The inter-RAT SFTD measurement can only be configured for E-UTRA - NR band combinations that are supported by the UE.

The accuracy requirements in Table 9.1.27.1-4 are appilicable under the following conditions:

For PCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [5] clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- $RSRP|_{dBm}$ according to Annex B.3.5 for a corresponding Band.
- Io range defined in Table 9.1.27.1-1.

**Table 9.1.27.1-1: PCell Io range conditions for SFTD measurement accuracy**

| Parameter | Io Note 1 range | | |
|---|---|---|---|
| | E-UTRA operating band groups Note 4, 5 | Minimum Io | Maximum Io |
| | | dBm/15kHz Note 2, 3 | $dBm/BW_{Channel}$ |
| Conditions | FDD_A, TDD_A | -121 | -50 |
| | FDD_C, TDD_C | -120 | -50 |
| | FDD_D | -119.5 | -50 |

| | | | |
|---|---|---|---|
| | FDD_E, TDD_E | -119 | -50 |
| | FDD_F | -118.5 | -50 |
| | FDD_G | -118 | -50 |
| | FDD_H | -117.5 | -50 |
| | FDD_N | -114.5 | -50 |

NOTE 1: When in dBm/15kHz, the minimum Io condition is expressed as the average Io per RE over all REs in that symbol. Io may be different in different symbols within a subframe.
NOTE 2: The condition level is increased by $\Delta$>0, when applicable, as described in clause B.4.2 and B.4.3.
NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA – NR band combination.
NOTE 4: NR operating band groups are as defined in clause 3.5 in TS 38.133 [50].
NOTE 5: Only E-UTRA bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable.

For NR PSCell, or NR cell SFN and frame timing measurement in FR1:

- Conditions defined in TS 38.101-1 [18] clause 7.3 for reference sensitivity are fulfilled.
- Io range defined in Table 9.1.27.1-2.

**Table 9.1.27.1-2: NR PSCell, or NR cell Io range conditions for SFTD measurement accuracy in FR1**

| Parameter | Io [Note 1] range | | | |
|---|---|---|---|---|
| | NR operating band groups [Note 4, 5] | Minimum Io [Note 2, 3] | | Maximum Io |
| | | dBm/ $SCS_{SSB}$ | | dBm/$BW_{Channel}$ |
| | | $SCS_{SSB}$ = 15 kHz | $SCS_{SSB}$ = 30 kHz | |
| Conditions | NR_FDD_FR1_A, NR_TDD_FR1_A | -121 | -118 | -50 |
| | NR_FDD_FR1_B | -120.5 | -117.5 | -50 |
| | NR_TDD_FR1_C | -120 | -117 | -50 |
| | NR_FDD_FR1_D, NR_TDD_FR1_D | -119.5 | -116.5 | -50 |
| | NR_FDD_FR1_E, NR_TDD_FR1_E | -119 | -116 | -50 |
| | NR_FDD_FR1_G | -118 | -115 | -50 |
| | NR_FDD_FR1_H | -117.5 | -114.5 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by $\Delta R_{IB,c}$ as defined in clause 7.3B in TS 38.101-3 [54], depending on E-UTRA – NR band combination.
NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA – NR band combination.
NOTE 4: NR operating band groups are as defined in clause 3.5 in TS 38.133 [50].
NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable.

For NR PSCell, or NR cell SFN and frame timing measurement in FR2:

- Conditions defined in TS 38.101-2 [19] clause 7.3 for reference sensitivity are fulfilled.
-- Io range defined in Table 9.1.27.1-3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in TS 38.101-2 [19] clause 7.3.4.

**Table 9.1.27.1-3: NR PSCell, or NR cell Io range conditions for SFTD measurement accuracy in FR2**

| Parameter | Io [Note 1] range | | |
|---|---|---|---|
| | Minimum Io [Note 2, 3] | | Maximum Io |
| | dBm/ $SCS_{SSB}$ | | dBm/$BW_{Channel}$ |
| | $SCS_{SSB}$ = 15 kHz | $SCS_{SSB}$ = 30 kHz | |
| Conditions | Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival | 50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in TS 38.101-2 [19] clauses 7.3.2 and 7.3.4. Applicable side condition selected depending on angle of arrival.
NOTE 3: In the test cases, the SSB Ês/Iot and related parameters may need to be adjusted to ensure Ês/Iot at UE baseband is above the value defined in this table.

**Table 9.1.27.1-4: SFTD measurement accuracy**

| Accuracy | Conditions | |
|---|---|---|
| | Ês/Iot | Frequency range |
| Ts [Note 1] | dB | |
| 40 | ≥ -3 dB | FR1 |
| 40 | | FR2 |
| NOTE 1: Ts is the basic timing unit defined in TS 36.211 [16].<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

## 9.1.28 SFN and Frame Timing Difference (SFTD) under CCA

### 9.1.28.1 SFTD Accuracy Requirement under CCA

The SFN and frame timing difference (SFTD) is measured between PCell and NR PSCell under CCA in EN-DC, or between PCell and NR cell under CCA for inter-RAT SFTD. The inter-RAT SFTD measurement can only be configured for E-UTRA - NR band combinations that are supported by the UE.

The accuracy requirements in Table 9.1.28.1-2 are appilicable under the following conditions:

For PCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [5] clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- $RSRP|_{dBm}$ according to Annex B.3.5 for a corresponding Band.
- Io range defined in Table 9.1.27.1-1 above.

For NR PSCell, or NR cell SFN and frame timing measurement in FR1:

- Conditions defined in TS 38.101-1 [18] clause 7.3F for reference sensitivity are fulfilled.
- Io range defined in Table 9.1.28.1-1.

**Table 9.1.28.1-1: NR PSCell, or NR cell Io range conditions for SFTD measurement accuracy with NR cell under CCA**

| Parameter | Io [Note 1] range | | | |
|---|---|---|---|---|
| | NR operating band groups [Note 4, 5] | Minimum Io [Note 2, 3] | | Maximum Io |
| | | dBm/ $SCS_{SSB}$ | | dBm/$BW_{Channel}$ |
| | | $SCS_{SSB}$ = 15 kHz | $SCS_{SSB}$ = 30 kHz | |
| Conditions | NR_CCA_FR1_I | -117 | -114 | -50 |
| | NR_CCA_FR1_J | -116.5 | -113.5 | -50 |
| NOTE 1: Io is assumed to have constant EPRE across the bandwidth.<br>NOTE 2: The condition level is increased by $\Delta R_{IB,c}$ as defined in clause 7.3B in TS 38.101-3 [54], depending on E-UTRA – NR band combination.<br>NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA – NR band combination.<br>NOTE 4: NR operating band groups are as defined in clause 3.5 in TS 38.133 [50].<br>NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable. | | | | |

**Table 9.1.28.1-2: SFTD measurement accuracy with NR cell under CCA**

| Accuracy | Conditions | |
|---|---|---|
| | Ês/Iot | Frequency range |
| Ts Note 1 | dB | |
| 40 | ≥ -3 dB | FR1 |
| NOTE 1: Ts is the basic timing unit defined in TS 36.211 [16].<br>NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of cells to which the requirement applies. | | |

# 9.2 UTRAN FDD Measurements

The requirements in this clause are applicable for a UE:

- in state RRC_CONNECTED
- performing measurements according to clause 8.1.2.4 with appropriate measurement gaps
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302 [6].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

## 9.2.1 UTRAN FDD CPICH RSCP

NOTE: This measurement is for handover between E-UTRAN and UTRAN FDD and for SON.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC_CONNECTED state is specified in clauses 8.1.2.4.1 and 8.1.2.4.2.

In RRC_CONNECTED state the accuracy requirements shall meet the absolute accuracy requirements in table 9.2.1-1, under the following conditions:

- CPICH Ec/Io condition for a detectable cell is as specified in clauses 8.1.2.4.1, 8.1.2.4.2, 8.1.2.4.7, 8.1.2.4.8;
- SCH_Ec/Io condition for a detectable cell is as specified in clauses 8.1.2.4.1, 8.1.2.4.2, 8.1.2.4.7, 8.1.2.4.8.

**Table 9.2.1-1: UTRAN FDD CPICH_RSCP absolute accuracy**

| Accuracy | | Conditions | | |
|---|---|---|---|---|
| Normal condition | Extreme condition | Io range | | |
| | | UTRA operating bands | Minimum Io | Maximum Io |
| dB | dB | | dBm/3.84 MHz | dBm/3.84 MHz |
| ±6 | ±9 | Band I, IV, VI, X XI, XIX and XXI | -94 | -70 |
| | | Band IX | -93 | -70 |
| | | Band II, V and VII | -92 | -70 |
| | | Band III, VIII, XII, XIII, XIV , XX and XXII | -91 | -70 |
| | | Band XXV, XXVI Note 1 | -90.5 | -70 |
| ±8 | ±11 | Note 2 | -70 | -50 |
| NOTE 1: For Band XXVI, the condition has the minimum Io of -92 dBm/3.84 MHz when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies.<br>NOTE 2: The same bands apply for this requirement as for the corresponding highest accuracy requirement. | | | | |

If the UE, in RRC_CONNECTED state, needs measurement gaps to perform UTRAN FDD measurements, the relevant UTRAN FDD measurement procedure and measurement gap pattern stated in clause 8.1.2.4 shall apply.

The reporting range and mapping specified for FDD CPICH RSCP in TS 25.133 [18] shall apply.

### 9.2.2 Void

### 9.2.3 UTRAN FDD CPICH Ec/No

NOTE: This measurement is for handover between E-UTRAN and UTRAN FDD and for SON.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC_CONNECTED state is specified in clauses 8.1.2.4.1 and 8.1.2.4.2.

In RRC_CONNECTED state the accuracy requirements shall be the same as the inter-frequency measurement accuracy requirements for FDD CPICH Ec/No in TS 25.133 [18].

If the UE, in RRC_CONNECTED state, needs measurement gaps to perform UTRAN FDD measurements, the UTRAN FDD measurement procedure and measurement gap pattern stated in clause 8.1.2.4.1 shall apply.

The reporting range and mapping specified for FDD CPICH Ec/No in TS 25.133 [18] shall apply.

## 9.3 UTRAN TDD Measurements

The requirements in this clause are applicable for a UE:

- in state RRC_CONNECTED
- performing measurements according to clause 8.1.2.4 with appropriate measurement gaps
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302 [6].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

### 9.3.1 UTRAN TDD P-CCPCH RSCP

NOTE: This measurement is for handover between E-UTRAN and UTRAN TDD and for SON.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC_CONNECTED state is specified in clauses 8.1.2.4.3 and 8.1.2.4.4.

In RRC_CONNECTED state the accuracy requirements shall be the same as the inter-frequency measurement accuracy requirements for TDD P-CCPCH in TS 25.123 [19].

If the UE, in RRC_CONNECTED state, needs measurement gaps to perform UTRAN TDD measurements, the relevant UTRAN TDD measurement procedure and measurement gap pattern stated in clause 8.1.2.4 shall apply.

The reporting range and mapping specified for TDD P-CCPCH RSCP in TS 25.123 [19] shall apply.

### 9.3.2 Void

### 9.3.3 Void

## 9.4 GSM Measurements

The requirements in this clause are applicable for a UE:

- in state RRC_CONNECTED
- performing measurements according to clause 8.1.2.4.5 with appropriate measurement gaps
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302 [6].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

### 9.4.1 GSM carrier RSSI

NOTE: This measurement is for handover between E-UTRAN and GSM.

The requirements in this clause are valid for terminals supporting this capability.

The measurement period for RRC_CONNECTED state is specified in clause 8.1.2.4.5.

In RRC_CONNECTED state the measurement accuracy requirements for RXLEV in TS 45.008 [8] shall apply.

If the UE, in RRC_CONNECED state, needs measurement gaps to perform GSM measurements, the GSM measurement procedure and measurement gap pattern stated in clause 8.1.2.4.5 shall apply.

The reporting range and mapping specified for RXLEV in TS 45.008 [8] shall apply.

## 9.5 CDMA2000 1x RTT Measurements

The requirements in this clause are applicable for a UE:

- in RRC_CONNECTED state.
- synchronised to the cell that is measured.

### 9.5.1 CDMA2000 1x RTT Pilot Strength

NOTE: This measurement is for handover between E-UTRAN and cdma2000 1 x RTT.

The requirements in this clause are valid for terminals supporting this capability.

CDMA2000 1xRTT Pilot Strength defined in sub-clause 5.1.10 of [4] shall meet the performance requirement defined in sub-clause 3.2.4 of [14] on the cdma2000 1xRTT neighbour cells indicated by the serving eNode B.

## 9.6 $P_{CMAX,c}$

For a UE configured with a secondary cell, the UE is required to report the UE configured maximum output power ($P_{CMAX,c}$) together with the power headroom. This clause defines the requirements for the $P_{CMAX,c}$ reporting.

### 9.6.1 Report Mapping

The $P_{CMAX,c}$ reporting range is defined from -29dBm to 33 dBm with 1 dB resolution. Table 9.6.1-1 defines the reporting mapping.

**Table 9.6.1-1 Mapping of $P_{CMAX,c}$**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| PCMAX_C_00 | $P_{CMAX,c} < -29$ | dBm |
| PCMAX_C_01 | $-29 \le P_{CMAX,c} < -28$ | dBm |
| PCMAX_C_02 | $-28 \le P_{CMAX,c} < -27$ | dBm |
| … | … | … |
| PCMAX_C_61 | $31 \le P_{CMAX,c} < 32$ | dBm |
| PCMAX_C_62 | $32 \le P_{CMAX,c} < 33$ | dBm |
| PCMAX_C_63 | $33 \le P_{CMAX,c}$ | dBm |

## 9.6.2 Estimation Period

When *extendedPHR* is configured and UE is required to include $P_{CMAX,c}$ in Extended PHR MAC control element as defined in subclause 5.4.6 in [17], the UE shall calculate the $P_{CMAX,c}$ per activated serving cell c for UL-SCH transmission according to subclause 6.2.5A of TS 36.101 [5] over 1 subframe.

## 9.6.3 Reporting Delay

The $P_{CMAX,c}$ reporting delay is defined as the time between the beginning of the $P_{CMAX,c}$ reference period and the time when the UE starts transmitting $P_{CMAX,c}$ over the radio interface. The reporting delay of the $P_{CMAX,c}$ shall be 0 ms, which is applicable for all configured triggering mechanisms for $P_{CMAX,c}$ reporting.

# 9.7 IEEE802.11 Measurements

The requirements in this clause are applicable for a UE:

- in RRC_CONNECTED state.
- synchronised to the IEEE 802.11 access point that is measured.

## 9.7.1 WLAN RSSI

NOTE: This measurement is for access network selection and traffic steering between E-UTRAN and WLAN.

The requirements in this clause are valid for terminals supporting this capability.

WLAN RSSI defined in sub-clause 5.1.16 of [4] shall meet the performance requirement defined in [32].

## 9.7.2 WLAN RSSI Measurement Report Mapping

This sub-clause 9.7.2 doesn't apply to LPP *WLAN-MeasurementInformation*. The WLAN RSSI measurement report mapping is defined in [32] for LPP *WLAN-MeasurementInformation*.

The reporting range of WLAN RSSI is defined from -100 dBm to 40 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 9.7.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.7.2-1: WLAN RSSI measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| WLAN RSSI_00 | WLAN RSSI < -100 | dBm |
| WLAN RSSI_01 | -100 ≤ WLAN RSSI < -99 | dBm |
| WLAN RSSI_02 | -99 ≤ WLAN RSSI < -98 | dBm |
| … | … | … |
| WLAN RSSI_139 | 38 ≤ WLAN RSSI < 39 | dBm |
| WLAN RSSI_140 | 39 ≤ WLAN RSSI < 40 | dBm |
| WLAN RSSI_141 | 40 ≤ WLAN RSSI | dBm |

# 9.8 MBSFN Measurements

## 9.8.1 Introduction

MBSFN measurements include MBSFN RSRP, MBSFN RSRQ, and MCH BLER, which are defined in [4]. The measurements are used for MDT.

The requirements in Section 9.8 apply for 15 kHz subcarrier spacing configured in MBSFN subframes. The same requirements apply also for 370.73 Hz, 2.5 kHz, 1.25 kHz and 7.5 kHz subcarrier spacing, provided that MBSFN RSRP|dBm/(L) kHz = MBSFN RSRP|dBm/15kHz + $10 \cdot \log_{10}(L/15)$, where L is 370.73 Hz, 2.5 kHz, 1.25 kHz or 7.5 kHz.

## 9.8.2 MBSFN RSRP

### 9.8.2.1 Absolute MBSFN RSRP measurement accuracy requirements

The requirements for absolute accuracy of MBSFN RSRP in this clause apply to any carrier, which may be the same as or different from any serving unicast carrier, where PMCH is received while meeting performance requirements in Section 10 of [5].

The accuracy requirements in Table 9.8.2.1-1 are valid under the following conditions:

MBSFN RS are transmitted from antenna port 4 in the MBSFN subframes where PMCH is received.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

MBSFN RSRP|dBm/15kHz is the same as RSRP|dBm/15kHz specified in Annex B.3.1 for each corresponding Band.

**Table 9.8.2.1-1: Absolute MBSFN RSRP measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot | E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | $dBm/BW_{Channel}$ | $dBm/BW_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FDD_A, TDD_A | -121 | N/A | -70 |
| | | | FDD_B1, FDD_B2 | -120.5 | N/A | -70 |
| | | | FDD_C, TDD_C | -120 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_H | -117.5 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD_A, TDD_A, FDD_B1, FDD_B2, FDD_C, TDD_C, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_H, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### 9.8.2.2 MBSFN RSRP measurement report mapping

The reporting range of MBSFN RSRP is defined from -140 dBm to -44 dBm with 1 dB resolution, for 15kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.2.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.2.2-1: MBSFN RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRP_00 | MBSFN_RSRP < -140 | dBm / 15 kHz |
| MBSFN_RSRP_01 | -140 ≤ MBSFN_RSRP < -139 | dBm / 15 kHz |
| MBSFN_RSRP_02 | -139 ≤ MBSFN_RSRP < -138 | dBm / 15 kHz |
| … | … | … |
| MBSFN_RSRP_95 | -46 ≤ MBSFN_RSRP < -45 | dBm / 15 kHz |
| MBSFN_RSRP_96 | -45 ≤ MBSFN_RSRP < -44 | dBm / 15 kHz |
| MBSFN_RSRP_97 | -44 ≤ MBSFN_RSRP | dBm / 15 kHz |

### 9.8.2.3 MBSFN RSRP measurement report mapping for 7.5 kHz subcarrier spacing

The reporting range of MBSFN RSRP is defined from -143 dBm to -47 dBm with 1 dB resolution, for 7.5 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.2.3-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.2.3-1: MBSFN RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRP_00 | MBSFN_RSRP < -143 | dBm / 7.5 kHz |
| MBSFN_RSRP_01 | -143 ≤ MBSFN_RSRP < -142 | dBm / 7.5 kHz |
| MBSFN_RSRP_02 | -142 ≤ MBSFN_RSRP < -141 | dBm / 7.5 kHz |
| … | … | dBm / 7.5 kHz |
| MBSFN_RSRP_95 | -49 ≤ MBSFN_RSRP < -48 | dBm / 7.5 kHz |
| MBSFN_RSRP_96 | -48 ≤ MBSFN_RSRP < -47 | dBm / 7.5 kHz |
| MBSFN_RSRP_97 | -47 ≤ MBSFN_RSRP | dBm / 7.5 kHz |

### 9.8.2.4 MBSFN RSRP measurement report mapping for 1.25 kHz subcarrier spacing

The reporting range of MBSFN RSRP is defined from -151 dBm to -55 dBm with 1 dB resolution, for 1.25 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.2.4-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.2.4-1: MBSFN RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRP_00 | MBSFN_RSRP < -151 | dBm / 1.25 kHz |
| MBSFN_RSRP_01 | -151 ≤ MBSFN_RSRP < -150 | dBm / 1.25 kHz |
| MBSFN_RSRP_02 | -150 ≤ MBSFN_RSRP < -149 | dBm / 1.25 kHz |
| … | … | dBm / 1.25 kHz |
| MBSFN_RSRP_95 | -57 ≤ MBSFN_RSRP < -56 | dBm / 1.25 kHz |
| MBSFN_RSRP_96 | -56 ≤ MBSFN_RSRP < -55 | dBm / 1.25 kHz |
| MBSFN_RSRP_97 | -55 ≤ MBSFN_RSRP | dBm / 1.25 kHz |

### 9.8.2.5 MBSFN RSRP measurement report mapping for 2.5 kHz subcarrier spacing

The reporting range of MBSFN RSRP is defined from -148 dBm to -52 dBm with 1 dB resolution, for 2.5 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.2.5-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.2.5-1: MBSFN RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRP_00 | MBSFN_RSRP < -148 | dBm / 2.5 kHz |
| MBSFN_RSRP_01 | -148 ≤ MBSFN_RSRP < -147 | dBm / 2.5 kHz |

| | | |
|---|---|---|
| MBSFN_RSRP_02 | -147 ≤ MBSFN_RSRP < -146 | dBm / 2.5 kHz |
| … | … | … |
| MBSFN_RSRP_95 | -54 ≤ MBSFN_RSRP < -53 | dBm / 2.5 kHz |
| MBSFN_RSRP_96 | -53 ≤ MBSFN_RSRP < -52 | dBm / 2.5 kHz |
| MBSFN_RSRP_97 | -52 ≤ MBSFN_RSRP | dBm / 2.5 kHz |

### 9.8.2.6 MBSFN RSRP measurement report mapping for 370.37Hz subcarrier spacing

The reporting range of MBSFN RSRP is defined from -156 dBm to -60 dBm with 1 dB resolution, for 370.37 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.2.6-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.2.6-1: MBSFN RSRP measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRP_00 | MBSFN_RSRP < -156 | dBm / 370.37Hz |
| MBSFN_RSRP_01 | -156 ≤ MBSFN_RSRP < -155 | dBm / 370.37Hz |
| MBSFN_RSRP_02 | -155 ≤ MBSFN_RSRP < -154 | dBm / 370.37Hz |
| … | … | … |
| MBSFN_RSRP_95 | -62 ≤ MBSFN_RSRP < -61 | dBm / 370.37Hz |
| MBSFN_RSRP_96 | -61 ≤ MBSFN_RSRP < -60 | dBm / 370.37Hz |
| MBSFN_RSRP_97 | -60 ≤ MBSFN_RSRP | dBm / 370.37Hz |

## 9.8.3 MBSFN RSRQ

### 9.8.3.1 Absolute MBSFN RSRQ measurement accuracy requirements

The requirements for absolute accuracy of MBSFN RSRQ in this clause apply to any carrier, which may be the same as or different from a serving unicast carrier, where PMCH is received while meeting performance requirements in Section 10 of [5].

The accuracy requirements in Table 9.8.3.1-1 are valid under the following conditions:

MBSFN RS are transmitted from antenna port 4 in the MBSFN subframes where PMCH is received.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

MBSFN RSRP|dBm/15kHz is the same as RSRP|dBm/15kHz specified in Annex B.3.1 for each corresponding Band.

**Table 9.8.3.1-1: Absolute MBSFN RSRQ measurement accuracy**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot | Io Note 1 range | | |
| | | | E-UTRA operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±2.5 | ±4 | ≥-3 dB | FDD_A, TDD_A | -121 | -50 |
| | | | FDD_B1, FDD_B2 | -120.5 | -50 |
| | | | FDD_C, TDD_C | -120 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_H | -117.5 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3.5 | ±4 | ≥-6 dB | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA operating band groups are as defined in Section 3.5.

### 9.8.3.2 MBSFN RSRQ measurement report mapping

The reporting range of MBSFN RSRQ is defined from -23 dB to -8 dB with 0.5 dB resolution, for 15 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.3.2-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.3.2-1: MBSFN RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRQ_00 | MBSFN_RSRQ < -23 | dB / 15 kHz |
| MBSFN_RSRQ_01 | -23 ≤ MBSFN_RSRQ < -22.5 | dB / 15 kHz |
| MBSFN_RSRQ_02 | -22.5 ≤ MBSFN_RSRQ < -22 | dB / 15 kHz |
| … | … | … |
| MBSFN_RSRQ_30 | -8.5 ≤ MBSFN_RSRQ < -8 | dB / 15 kHz |
| MBSFN_RSRQ_31 | -8 ≤ MBSFN_RSRQ | dB / 15 kHz |

### 9.8.3.3 MBSFN RSRQ measurement report mapping for 7.5 kHz subcarrier spacing

The reporting range of MBSFN RSRQ is defined from -26 dB to -8 dB with 0.4 dB resolution, for 7.5 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.3.3-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.3.3-1: MBSFN RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRQ_00 | MBSFN_RSRQ < -26.0 | dB |
| MBSFN_RSRQ_01 | -26.0 ≤ MBSFN_RSRQ < -25.4 | dB |
| MBSFN_RSRQ_02 | -25.4 ≤ MBSFN_RSRQ < -24.8 | dB |
| … | … | … |
| MBSFN_RSRQ_30 | -8.6 ≤ MBSFN_RSRQ < -8 | dB |
| MBSFN_RSRQ_31 | -8 ≤ MBSFN_RSRQ | dB |

### 9.8.3.4 MBSFN RSRQ measurement report mapping for 1.25 kHz subcarrier spacing

The reporting range of MBSFN RSRQ is defined from -32 dB to -14 dB with 0.4 dB resolution, for 1.25 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.3.4-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.3.4-1: MBSFN RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRQ_00 | MBSFN_RSRQ < -32 | dB |
| MBSFN_RSRQ_01 | -32 ≤ MBSFN_RSRQ < -31.4 | dB |
| MBSFN_RSRQ_02 | -31.4 ≤ MBSFN_RSRQ < -30.8 | dB |
| … | … | … |
| MBSFN_RSRQ_30 | -14.6 ≤ MBSFN_RSRQ < -14 | dB |
| MBSFN_RSRQ_31 | -14 ≤ MBSFN_RSRQ | dB |

### 9.8.3.5 MBSFN RSRQ measurement report mapping for 2.5 kHz subcarrier spacing

The reporting range of MBSFN RSRQ is defined from -31 dB to -13 dB with 0.6 dB resolution, for 2.5 kHz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.3.5-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.3.5-1: MBSFN RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRQ_00 | MBSFN_RSRQ < -31 | dB |
| MBSFN_RSRQ_01 | -31 ≤ MBSFN_RSRQ < -30.4 | dB |
| MBSFN_RSRQ_02 | -30.4 ≤ MBSFN_RSRQ < -29.8 | dB |
| … | … | … |
| MBSFN_RSRQ_30 | -13.6 ≤ MBSFN_RSRQ < -13 | dB |
| MBSFN_RSRQ_31 | -13 ≤ MBSFN_RSRQ | dB |

### 9.8.3.6 MBSFN RSRQ measurement report mapping for 370.37 kHz subcarrier spacing

The reporting range of MBSFN RSRQ is defined from -38 dB to -16 dB with 0.7 dB resolution, for 370.37Hz subcarrier spacing.

The mapping of measured quantity is defined in Table 9.8.3.6-1. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.8.3.6-1: MBSFN RSRQ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MBSFN_RSRQ_00 | MBSFN_RSRQ < -38 | dB |
| MBSFN_RSRQ_01 | -39.0 ≤ MBSFN_RSRQ < -38.3 | dB |
| MBSFN_RSRQ_02 | -38.3 ≤ MBSFN_RSRQ < -37.6 | dB |
| … | … | … |
| MBSFN_RSRQ_30 | -17.7 ≤ MBSFN_RSRQ < -17 | dB |
| MBSFN_RSRQ_31 | -16 ≤ MBSFN_RSRQ | dB |

## 9.8.4 MCH BLER

MCH BLER shall be measured as defined in [4].

### 9.8.4.1 Measurement report mapping for MCH BLER

The UE shall report MCH BLER together with the corresponding total number of MCH blocks, which were received by the UE during the MCH BLER measurement period and used for calculating the reported MCH BLER.

The reporting range of MCH BLER is defined from 0.1% to 50% with uniform quantization in log domain.

The mapping of measured quantity is defined in Table 9.8.4.1-1. The range in the signalling may be larger than the range specified in the table below.

**Table 9.8.4.1-1: MCH BLER measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| MCH BLER_00 | MCH BLER < 0.1 | % |
| MCH BLER_01 | 0.1≤ MCH BLER < 0.123 | % |
| MCH BLER_02 | 0.123≤ MCH BLER < 0.151 | % |
| MCH BLER_03 | 0.151≤ MCH BLER <0.186 | % |
| MCH BLER_04 | 0.186≤ MCH BLER <0.229 | % |
| MCH BLER_05 | 0.229≤ MCH BLER <0.282 | % |
| MCH BLER_06 | 0. 282≤ MCH BLER <0.347 | % |
| MCH BLER_07 | 0. 347≤ MCH BLER <0.426 | % |
| MCH BLER_08 | 0. 426≤ MCH BLER <0.525 | % |
| MCH BLER_09 | 0. 525≤ MCH BLER <0.645 | % |
| MCH BLER_10 | 0. 645≤ MCH BLER <0.794 | % |
| MCH BLER_11 | 0. 794≤ MCH BLER <0.976 | % |
| MCH BLER_12 | 0. 976≤ MCH BLER <1.201 | % |

| | | |
|---|---|---|
| MCH BLER_13 | 1. 201≤ MCH BLER <1.478 | % |
| MCH BLER_14 | 1. 478≤ MCH BLER <1.818 | % |
| MCH BLER_15 | 1. 818≤ MCH BLER <2.236 | % |
| MCH BLER_16 | 2. 236≤ MCH BLER <2.751 | % |
| MCH BLER_17 | 2. 751≤ MCH BLER <3.384 | % |
| MCH BLER_18 | 3. 384≤ MCH BLER <4.163 | % |
| MCH BLER_19 | 4.163≤ MCH BLER <5.121 | % |
| MCH BLER_20 | 5.121≤ MCH BLER <6.300 | % |
| MCH BLER_21 | 6.300≤ MCH BLER <7.750 | % |
| MCH BLER_22 | 7.750≤ MCH BLER <9.533 | % |
| MCH BLER_23 | 9.533≤ MCH BLER <11.728 | % |
| MCH BLER_24 | 11.728≤ MCH BLER <14.427 | % |
| MCH BLER_25 | 14.427≤ MCH BLER <17.478 | % |
| MCH BLER_26 | 17.478≤ MCH BLER <21.833 | % |
| MCH BLER_27 | 21.833≤ MCH BLER <26.858 | % |
| MCH BLER_28 | 26.858≤ MCH BLER <33.040 | % |
| MCH BLER_29 | 33.040≤ MCH BLER <40.645 | % |
| MCH BLER_30 | 40.645≤ MCH BLER < 50 | % |
| MCH BLER_31 | 50 ≤ MCH BLER | % |

### 9.8.4.2 Measurement report mapping for MCH Block Number

The reporting range of the total number of received MCH blocks during the measurement period is defined from 0 to 65152. The total number of received MCH blocks is quantized to two values n and m with the mappings defined in Table 9.8.4.2-1 and Table 9.8.4.2-2, respectively.

The range in the signalling may be larger than the range specified in the table below.

$N_R$ in Table 9.8.4.2-1 and Table 9.8.4.2-2 represents the total number of received MCH blocks. $f(N_R)$ is a function of $N_R$ with the definition that $f\left(N_R\right)=\frac{N_R-\left(2^n-1\right)\times 2^8}{2^n}$, from where the quantized total number of MCH blocks is found as $\left(2^n-1\right)\times 2^8+m\times 2^n$.

**Table 9.8.4.2-1: Number of received MCH blocks mapping to n**

| Reported value, n | Number of received MCH blocks |
|---|---|
| MCH_NR_N_00 | $0 \le N_R < 256$ |
| MCH_NR_N_01 | $256 \le N_R < 768$ |
| MCH_NR_N_02 | $768 \le N_R < 1792$ |
| MCH_NR_N_03 | $1792 \le N_R < 3840$ |
| MCH_NR_N_04 | $3840 \le N_R < 7936$ |
| MCH_NR_N_05 | $7936 \le N_R < 16128$ |
| MCH_NR_N_06 | $16128 \le N_R < 32512$ |
| MCH_NR_N_07 | $32512 \le N_R$ |

**Table 9.8.4.2-2: Number of received MCH blocks mapping to m**

| Reported value, m | $f(N_R)$ |
|---|---|
| MCH_NR_M_00 | $0 \le f(N_R) < 1$ |
| MCH_NR_M_01 | $1 \le f(N_R) < 2$ |
| MCH_NR_M_02 | $2 \le f(N_R) < 3$ |
| … | … |
| MCH_NR_M_253 | $253 \le f(N_R) < 254$ |
| MCH_NR_M_254 | $254 \le f(N_R) < 255$ |
| MCH_NR_M_255 | $255 \le f(N_R)$ |

# 9.9 ProSe Measurements

## 9.9.1 Introduction

The requirements in this section are applicable for a UE capable of ProSe Direct Communication and/or ProSe Direct Discovery.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in [25].

The accuracy requirements in this clause are:

- applicable for AWGN radio propagation conditions,
- assume independent interference (noise) at each receiver antenna port.
- valid for the reported measurement result after layer 1 filtering,
- are verified from the measurement report at point D in the measurement model having the higher layer filtering disabled.

## 9.9.2 Intra-Frequency S-RSRP Measurement Accuracy Requirements

### 9.9.2.1 Absolute S-RSRP Accuracy

The requirements for absolute accuracy of S-RSRP in this clause apply to a ProSe synchronization source on the same frequency as that of the own ProSe UE performing the measurement.

The accuracy requirements in Table 9.9.2.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3D for reference sensitivity are fulfilled.
- S-RSRP|dBm according to Annex B.5.1 for a corresponding Band are fulfilled.

**Table 9.9.2.1-1: Intra-frequency S-RSRP absolute accuracy for UE capable of ProSe Direct Communication and/or ProSe Direct Discovery**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| | | | Io Note 1 range | | |
| Normal condition | Extreme condition | Ês/Iot Note 4 | E-UTRA ProSe operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | FDD_A | -121 | N/A | -70 |
| | | | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E, TDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | FDD_A, FDD_D, FDD_E, TDD_E, FDD_F, FDD_G, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 4: Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS

### 9.9.2.2 Relative Accuracy of S-RSRP

The relative accuracy of S-RSRP is defined as the S-RSRP measured from one ProSe synchronization source compared to the S-RSRP measured from another ProSe synchronization source on the same frequency.

The accuracy requirements in Table 9.9.2.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3D for reference sensitivity are fulfilled.
- S-RSRP1,2$|_{dBm}$ according to Annex B.5.2 for a corresponding Band.

**Table 9.9.2.2-1: S-RSRP Intra frequency relative accuracy for UE capable of ProSe direct communication and/or ProSe Direct Discovery**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2, 6 | Io Note 1 range | | |
| | | | E-UTRA ProSe operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/$BW_{Channel}$ |
| ±2 | ±3 | ≥-3 dB | FDD_A | -121 | -50 |
| | | | FDD_D | -119.5 | -50 |
| | | | FDD_E, TDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3 | ±3 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of SyncRef UEs to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 6: Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS

## 9.9.3 Intra-Frequency SD-RSRP Measurement Accuracy Requirements

The requirements in this clause are applicable for a remote ProSe UE:

- in state RRC_IDLE or RRC_CONNECTED if the frequency used for ProSe is the serving frequency, or
- is out of coverage on the frequency used for ProSe, and
- that is synchronised to the ProSe relay UE that is measured.

### 9.9.3.1 Absolute SD-RSRP Accuracy

The requirements for absolute accuracy of SD-RSRP in this clause apply to a ProSe UE performing SD-RSRP measurements on the same frequency as used by the ProSe relay UE transmitting the relay Discovery message.

The accuracy requirements in Table 9.9.3.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3D for reference sensitivity are fulfilled.
- SD-RSRP|dBm according to Annex B.5.4 for a corresponding Band are fulfilled.
- *numReTx* is configured as 3 for the relay Discovery transmissions. For *numReTx* < 3, the minimum $\hat{E}s/N_{oc}$ at which the accuracy requirements are fulfilled is expected to be higher than as specified for *numReTx*=3.

**Table 9.9.3.1-1: Intra-frequency SD-RSRP absolute accuracy for remote UE [2] capable of ProSe Direct Communication and ProSe Direct Discovery and configured by upper layers for relay operation.**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | $\hat{E}s/N_{oc}$ Note 4 | Io Note 1 range | | |
| | | | E-UTRA ProSe operating band groups Note 3 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/$BW_{Channel}$ | dBm/$BW_{Channel}$ |
| ±4.5 | ±9 | ≥-1.5 dB | FDD_D | -119.5 | N/A | -70 |
| | | | FDD_E | -119 | N/A | -70 |
| | | | FDD_F | -118.5 | N/A | -70 |
| | | | FDD_G | -118 | N/A | -70 |
| | | | FDD_N | -114.5 | N/A | -70 |
| ±8 | ±11 | ≥-1.5 dB | FDD_D, FDD_E, FDD_F, FDD_G, FDD_N | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 4: When *numReTx* is configured as 3 for the relay Discovery transmissions. For *numReTx* < 3, the minimum $\hat{E}s/N_{oc}$ at which the accuracy requirements are fulfilled is expected to be higher than as specified for *numReTx*=3.
NOTE 5: Layer 1 filtering for SD-RSRP is performed using PSDCH (re)transmissions within a discovery period.

## 9.9.3.2 Relative Accuracy of SD-RSRP

The relative accuracy of SD-RSRP in this clause apply to a ProSe UE performing SD-RSRP measurements on the same frequency as used by the ProSe relay UE transmitting the relay Discovery message.

The accuracy requirements in Table 9.9.3.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3D for reference sensitivity are fulfilled.
- SD-RSRP|dBm according to Annex B.5.5 for a corresponding Band are fulfilled.
- *numReTx* is configured as 3 for the relay Discovery transmissions. For *numReTx* < 3, the minimum $\hat{E}s/N_{oc}$ at which the accuracy requirements are fulfilled is expected to be higher than as specified for *numReTx*=3.

**Table 9.9.3.2-1: Intra-frequency SD-RSRP relative accuracy for remote UE [2] capable of ProSe Direct Communication and ProSe Direct Discovery and configured by upper layers for relay operation.**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | $\hat{E}s/N_{oc}$ Note 6 | Io Note 1 range | | |
| | | | E-UTRA ProSe operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/$BW_{Channel}$ |
| ±2 | ±3 | ≥-1.5 dB | FDD_D | -119.5 | -50 |
| | | | FDD_E | -119 | -50 |
| | | | FDD_F | -118.5 | -50 |
| | | | FDD_G | -118 | -50 |
| | | | FDD_N | -114.5 | -50 |
| ±3 | ±3 | ≥-1.5 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter $\hat{E}s/N_{oc}$ is the minimum $\hat{E}s/N_{oc}$ of the pair of ProSe Relay UEs to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.

NOTE 5: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 6: When *numReTx* is configured as 3 for the relay Discovery transmissions. For *numReTx* < 3, the minimum $\hat{E}s/N_{oc}$ at which the accuracy requirements are fulfilled is expected to be higher than as specified for *numReTx*=3.
NOTE 7: Layer 1 filtering for SD-RSRP is performed using PSDCH (re)transmissions within a discovery period.

# 9.10 V2X Measurements

## 9.10.1 Introduction

The requirements in this section are applicable for a UE capable of V2X sidelink communication.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in [25].

The accuracy requirements in this clause are:

- applicable for AWGN radio propagation conditions,
- assume independent interference (noise) at each receiver antenna port.
- valid for the reported measurement result after layer 1 filtering,
- are verified from the measurement report at point D in the measurement model having the higher layer filtering disabled.

## 9.10.2 Intra-Frequency S-RSRP Measurement Accuracy Requirements

### 9.10.2.1 Absolute S-RSRP Accuracy

The requirements for absolute accuracy of S-RSRP in this clause apply to a V2X synchronization source on the same frequency as that of the own V2X UE performing the measurement.

The accuracy requirements in Table 9.10.2.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3.1G for reference sensitivity are fulfilled.
- S-RSRP|dBm according to Annex B.6.2 for a corresponding Band are fulfilled.

**Table 9.10.2.1-1: Intra-frequency S-RSRP absolute accuracy for UE capable of V2X sidelink communication**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 4 | Io Note 1 range | | | |
| | | | E-UTRA V2X operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±4.5 | ±9 | ≥-6 dB | TDD_G | -118 | N/A | -70 |
| ±8 | ±11 | ≥-6 dB | TDD_G | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 4: Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS

### 9.10.2.2 Relative Accuracy of S-RSRP

The relative accuracy of S-RSRP is defined as the S-RSRP measured from one V2X synchronization source compared to the S-RSRP measured from another V2X synchronization source on the same frequency.

The accuracy requirements in Table 9.10.2.2-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3.1G for reference sensitivity are fulfilled.
- S-RSRP1,2$|_{dBm}$ according to Annex B.6.3 for a corresponding Band.

**Table 9.10.2.2-1: S-RSRP Intra frequency relative accuracy for UE capable of V2X sidelink communication**

| Accuracy | | Conditions | | | |
|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 2, 6 | Io Note 1 range | | |
| | | | E-UTRA V2X operating band groups Note 5 | Minimum Io | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 4 | dBm/BW$_{Channel}$ |
| ±2 | ±3 | ≥-3 dB | TDD_G | -118 | -50 |
| ±3 | ±3 | ≥-6 dB | Note 3 | Note 3 | Note 3 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The parameter Ês/Iot is the minimum Ês/Iot of the pair of SyncRef UEs to which the requirement applies.
NOTE 3: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 4: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 5: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 6: Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS

## 9.10.3 PSSCH-RSRP Measurement Accuracy Requirements

### 9.10.3.1 Intra-frequency Absolute PSSCH-RSRP Accuracy

The requirements for absolute accuracy of PSSCH-RSRP in this clause apply to a UE performing PSSCH-RSRP measurements on the same frequency as used by operating V2X sidelink communication.

The accuracy requirements in this clause are:

- applicable for AWGN radio propagation conditions,
- assume independent interference (noise) at each receiver antenna port.

The accuracy requirements in Table 9.10.3.1-1 are valid under the following conditions:

- Demodulation reference signals are transmitted from one port.
- Conditions defined in 36.101 Clause 7.3.1G for reference sensitivity are fulfilled.
- PSSCH-RSRP|dBm according to Annex B.6.5 for a corresponding Band are fulfilled.

**Table 9.10.3.1-1: Intra-frequency PSSCH-RSRP absolute accuracy for UE capable of V2X sidelink communication**

| Accuracy | | Conditions | | | | |
|---|---|---|---|---|---|---|
| Normal condition | Extreme condition | Ês/Iot Note 4 | Io Note 1 range | | | |
| | | | E-UTRA V2X operating band groups Note 3 | Minimum Io | | Maximum Io |
| dB | dB | dB | | dBm/15kHz Note 2 | dBm/BW$_{Channel}$ | dBm/BW$_{Channel}$ |
| ±5 | ±9.5 | ≥0 | TDD_G | -118 | N/A | -70 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ±8.5 | ±11.5 | ≥0 | TDD_G | N/A | -70 | -50 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 3: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 4: The parameter Ês/Iot is the Ês/Iot of PSSCH-DMRS.

## 9.10.4 S-RSSI Measurement Accuracy Requirements

### 9.10.4.1 Intra-frequency absolute S-RSSI measurement accuracy requirements

The intra-frequency S-RSSI requirements are specified in Table 9.10.4.1-1. The requirements apply for measurement period of 1subframe (1ms) and for any configured measurement bandwidth larger than 5RBs (0.9MHz), provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same measurement interval.

**Table 9.10.4.1-1: Intra-frequency S-RSSI absolute accuracy**

| Accuracy | | Conditions | | |
|---|---|---|---|---|
| Normal condition | Extreme condition | E-UTRA V2X operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±2.5 | ±5.5 | TDD_G | -118 | -50 |
| ±4.5 | ±7.5 | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA V2X operating band groups are as defined in Section 3.5.

### 9.10.4.2 Intra-frequency relative S-RSSI measurement accuracy requirements

The relative accuracy of S-RSSI is defined as the RSRP measured on one configured measurement bandwidth compared to the S-RSSI measured on another configured measurement bandwidth.The intra-frequency S-RSSI relative requirements are specified in Table 9.10.4.2-1. The requirements apply for measurement period of 1000subframe (1s), for any configured measurement bandwidth larger than 5RBs (0.9MHz), and for sampling interval of 20ms,50ms and 100ms, provided that:

- All symbols duing each RSSI measurement duration are available for RSSI sampling within the same measurement interval.

**Table 9.10.4.2-1: Intra-frequency S-RSSI relative accuracy**

| Accuracy | | Conditions | | |
|---|---|---|---|---|
| Normal condition | Extreme condition | E-UTRA V2X operating band groups Note 4 | Minimum Io | Maximum Io |
| dB | dB | | dBm/15kHz Note 3 | dBm/BW$_{Channel}$ |
| ±2.5 | ±5.5 | TDD_G | -118 | -50 |
| ±4.5 | ±7.5 | Note 2 | Note 2 | Note 2 |

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
NOTE 2: The same bands and the same Io conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
NOTE 3: The condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 4: E-UTRA V2X operating band groups are as defined in Section 3.5.

# 9.11 NR Measurements

Unless otherwise specifically stated, the requirements in this clause are applicable for a UE:

- in RRC_CONNECTED state
- performing inter-RAT E-UTRAN FDD – NR or E-UTRAN TDD – NR measurements with appropriate measurement gaps according to Section 8
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302 [6].

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

## 9.11.1 NR SS-RSRP Measurements

The accuracy requirements of NR SS-RSRP measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.4.1. The accuracy requirements of NR SS-RSRP measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.5.1.

The measurement period of NR SS-RSRP measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.21 for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRP measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.22 for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRP measurements in RRC_CONNECTED state is specified in Sections 8.17.4.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRP measurements in RRC_CONNECTED state is specified in Sections 8.17.4.2.

The reporting range and mapping specified for SS-RSRP measurements in TS 38.133 [50] subclause 10.1.6 shall apply.

## 9.11.1A NR SS-RSRP Measurements for DC Idle Mode Measurements

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements for absolute accuracy of NR SS-RSRP in this clause apply to a cell on an NR frequency, and the target cell has been measured by UE for DC Idle Mode Measurements as specified in clause 4.9.

The accuracy requirements of NR SS-RSRP measurements in FR1 and the corresponding side conditions shall be the same as the Inter-frequency RSRP accuracy requirements for FR1 CA/DC Idle Mode Measurements in TS 38.133 [50] subclause 10.1.4B. The accuracy requirements of NR SS-RSRP measurements in FR2 and the corresponding side conditions shall be the same as the Inter-frequency RSRP accuracy requirements for FR2 CA/DC Idle Mode Measurements in TS 38.133 [50] subclause 10.1.5B.

The reporting range and mapping specified for SS-RSRP measurements in TS 38.133 [50] subclause 10.1.6 shall apply.

## 9.11.2 NR SS-RSRQ Measurements

The accuracy requirements of NR SS-RSRQ measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRQ Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.9.1. The accuracy requirements of NR SS-RSRQ measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRQ Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.10.1.

The measurement period of NR SS-RSRQ measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.21 for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRQ measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.22 for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements in RRC_CONNECTED state is specified in Sections 8.17.4.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements in RRC_CONNECTED state is specified in Sections 8.17.4.2.

The reporting range and mapping specified for SS-RSRQ measurements in TS 38.133 [50] subclause 10.1.11 shall apply.

## 9.11.2A NR SS-RSRQ Measurements for DC Idle Mode Measurements

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE
- that is synchronised to the cell that is measured.

The requirements for absolute accuracy of NR SS-RSRQ in this clause apply to a cell on an NR frequency, and the target cell has been measured by UE for DC Idle Mode Measurements as specified in clause 4.9.

The accuracy requirements of NR SS-RSRQ measurements in FR1 and the corresponding side conditions shall be the same as the Inter-frequency RSRQ accuracy requirements for FR1 CA/DC Idle Mode Measurements in TS 38.133 [50] subclause 10.1.9B. The accuracy requirements of NR SS-RSRQ measurements in FR2 and the corresponding side conditions shall be the same as the Inter-frequency RSRQ accuracy requirements for FR2 CA/DC Idle Mode Measurements in TS 38.133 [50] subclause 10.1.10B.

The reporting range and mapping specified for SS-RSRQ measurements in TS 38.133 [50] subclause 10.1.11 shall apply.

## 9.11.3 NR SS-SINR Measurements

The accuracy requirements of NR SS-SINR measurements in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.14.1. The accuracy requirements of NR SS-SINR measurements in FR2 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.15.1.

The measurement period of NR SS-SINR measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.21 for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-SINR measurements in RRC_CONNECTED state is specified in Sections 8.1.2.4.22 for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements in RRC_CONNECTED state is specified in Sections 8.17.4.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements in RRC_CONNECTED state is specified in Sections 8.17.4.2.

The reporting range and mapping specified for SS-SINR measurements in TS 38.133 [50] subclause 10.1.16 shall apply.

## 9.11.4 NR SS-RSRP Measurements under CCA

The accuracy requirements of NR SS-RSRP measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRP Absolute Accuracy Requirements under CCA in TS 38.133 [50] subclause 10.1.27.1.

The measurement period of NR SS-RSRP measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRP measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRP measurements under CCA in RRC_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell

configured with E-UTRA-NR Dual Connectivity operation, the measurement period under CCA of NR SS-RSRP measurements in RRC_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-RSRP measurements in TS 38.133 [50] subclause 10.1.6 shall apply.

## 9.11.5 NR SS-RSRQ Measurements under CCA

The accuracy requirements of NR SS-RSRQ measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-RSRQ Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.30.1.

The measurement period of NR SS-RSRQ measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-RSRQ measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements under CCA in RRC_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-RSRQ measurements under CCA in RRC_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-RSRQ measurements in TS 38.133 [50] subclause 10.1.11 shall apply.

## 9.11.6 NR SS-SINR Measurements under CCA

The accuracy requirements of NR SS-SINR measurements under CCA in FR1 and the corresponding side conditions shall be the same as the inter-frequency SS-SINR Absolute Accuracy Requirements in TS 38.133 [50] subclause 10.1.32.1.

The measurement period of NR SS-SINR measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation. The measurement period of NR SS-SINR measurements under CCA in RRC_CONNECTED state is specified in Sections 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation. For for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements under CCA in RRC_CONNECTED state is specified in Sections 8.17.4A.1. For for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation, the measurement period of NR SS-SINR measurements under CCA in RRC_CONNECTED state is specified in Sections 8.17.4A.2.

The reporting range and mapping specified for SS-SINR measurements in TS 38.133 [50] subclause 10.1.16 shall apply.

## 9.11.7 NR RSSI Measurements under CCA

The accuracy requirements of NR RSSI measurements in FR1 on a non-serving carrier frequency with CCA and the corresponding side conditions shall be the same as the inter-frequency RSSI absolute accuracy requirements in TS 38.133 [50] subclause 10.1.34.2. The accuracy requirements of NR RSSI measurements in FR1 on a serving carrier frequency with CCA and the corresponding side conditions shall be the same as the intra-frequency RSSI absolute accuracy requirements in TS 38.133 [50] subclause 10.1.34.1.

The measurement period of NR RSSI measurements in RRC_CONNECTED state is specified in clause 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation; clause 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation; clause 8.17.4A.1 for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation with PSCC on a carrier frequency with CCA; clause 8.17.4A.2 for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation with PSCC on a carrier frequency with CCA.

The reporting range and mapping specified for RSSI measurements in TS 38.133 [50] subclause 10.1.34.3 shall apply.

## 9.11.8 NR Channel Occupancy Measurements under CCA

The accuracy requirements of NR channel occupancy measurements in FR1 on a non-serving carrier frequency with CCA and the corresponding side conditions shall be the same as the inter-frequency channel occupancy accuracy requirements in TS 38.133 [50] subclause 10.1.35.2. The accuracy requirements of NR channel occupancy

measurements in FR1 on a serving carrier frequency with CCA and the corresponding side conditions shall be the same as the intra-frequency channel occupancy accuracy requirements in TS 38.133 [50] subclause 10.1.35.1.

The measurement period of NR channel occupancy measurements in RRC_CONNECTED state is specified in clause 8.1.2.4.21A for UE with FDD PCell not configured with E-UTRA-NR Dual Connectivity operation; clause 8.1.2.4.22A for UE with TDD PCell not configured with E-UTRA-NR Dual Connectivity operation; clause 8.17.4A.1 for UE with FDD PCell configured with E-UTRA-NR Dual Connectivity operation with PSCC on a carrier frequency with CCA; clause 8.17.4A.2 for UE with TDD PCell configured with E-UTRA-NR Dual Connectivity operation with PSCC on a carrier frequency with CCA.

The reporting range specified for channel occupancy measurements in TS 38.331 [2] shall apply.

# 10 Measurements Performance Requirements for E-UTRAN

## 10.1 Received Interference Power

The measurement period shall be 100 ms.

### 10.1.1 Absolute accuracy requirement

**Table 10.1.1-1: Received Interference Power absolute accuracy**

| Parameter | Unit | Accuracy [dB] | Conditions |
|---|---|---|---|
| | | | Iob [dBm/180 kHz] |
| Iob | dBm/180 kHz | ± 4 | -117 ... -96 |

### 10.1.2 Relative accuracy requirement

The relative accuracy is defined as the Received Interference Power measured at one frequency compared to the Received Interference Power measured from the same frequency at a different time.

**Table 10.1.2-1: Received Interference Power relative accuracy**

| Parameter | Unit | Accuracy [dB] | Conditions |
|---|---|---|---|
| | | | Iob [dBm/180 kHz] |
| Iob | dBm/180 kHz | ± 0.5 | -117 ... -96<br>AND for changes ≤ ±9.0 dB |

### 10.1.3 Received Interference Power measurement report mapping

The reporting range for *Received Interference Power (RIP)* is from -126 ... -75 dBm.

In table 10.2.3-1 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 10.1.3-1: Received Interference Power measurement reporting range**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| RTWP_LEV _000 | RIP < -126.0 | dBm |
| RTWP_LEV _001 | -126.0 ≤ RIP < -125.9 | dBm |
| RTWP_LEV _002 | -125.9 ≤ RIP < -125.8 | dBm |
| … | … | … |
| RTWP_LEV _509 | -75.2 ≤ RIP < -75.1 | dBm |
| RTWP_LEV _510 | -75.1 ≤ RIP < -75.0 | dBm |
| RTWP_LEV _511 | -75.0 ≤ RIP | dBm |

## 10.2 Angle of Arrival (AOA)

### 10.2.1 Range/mapping

The reporting range for AOA measurement is from 0 to 360 degree, with resolution of 0.5 degree.

The mapping of the measured quantity is defined in table 10.2.1-1.

**Table 10.2.1-1: AOA measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| AOA_ANGLE _000 | 0 ≤ AOA_ANGLE < 0.5 | degree |
| AOA_ANGLE _001 | 0.5 ≤ AOA_ANGLE < 1 | degree |
| AOA_ANGLE _002 | 1 ≤ AOA_ANGLE < 1.5 | degree |
| … | … | … |
| AOA_ANGLE _717 | 358.5 ≤ AOA_ANGLE < 359 | degree |
| AOA_ANGLE _718 | 359 ≤ AOA_ANGLE < 359.5 | degree |
| AOA_ANGLE _719 | 359.5 ≤ AOA_ANGLE < 360 | degree |

## 10.3 Timing Advance ($T_{ADV}$)

### 10.3.1 Report mapping

The reporting range of $T_{ADV}$ is defined from 0 to $49232T_s$ with $2T_s$ resolution for timing advance less or equal to $4096T_s$ and $8T_s$ for timing advance greater than $4096T_s$.

The mapping of measured quantity is defined in Table 10.3.1-1.

**Table 10.3.1-1: $T_{ADV}$ measurement report mapping**

| Reported value | Measured quantity value | Unit |
|---|---|---|
| TIME_ADVANCE_00 | $T_{ADV} < 2$ | $T_s$ |
| TIME_ADVANCE_01 | $2 \le T_{ADV} < 4$ | $T_s$ |
| TIME_ADVANCE_02 | $4 \le T_{ADV} < 6$ | $T_s$ |
| … | … | … |
| TIME_ADVANCE_2046 | $4092 \le T_{ADV} < 4094$ | $T_s$ |
| TIME_ADVANCE_2047 | $4094 \le T_{ADV} < 4096$ | $T_s$ |
| TIME_ADVANCE_2048 | $4096 \le T_{ADV} < 4104$ | $T_s$ |
| TIME_ADVANCE_2049 | $4104 \le T_{ADV} < 4112$ | $T_s$ |
| … | … | … |
| TIME_ADVANCE_7688 | $49216 \le T_{ADV} < 49224$ | $T_s$ |
| TIME_ADVANCE_7689 | $49224 \le T_{ADV} < 49232$ | $T_s$ |
| TIME_ADVANCE_7690 | $49232 \le T_{ADV}$ | $T_s$ |

NOTE: For report mapping of type2 $T_{ADV}$ for TDD, the $T_{ADV}$ equal to (eNB Rx – Tx time difference) + 624Ts.

# 11 ProSe Requirements in Any Cell Selection state

## 11.1 Introduction

This section contains the requirements for the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery when the UE is out of coverage on the carrier used for ProSe operation, as defined in [1]. The ProSe requirements shall apply provided that the sidelink used by the UE for ProSe Direct Communication and/or ProSe Direct Discovery is on the carrier that is preconfigured in the ProSe UE for out-of-coverage operation. The requirement apply when the UE is:

- in any cell selection state, or,
- out of coverage on the ProSe carrier and is associated with a serving cell on a non-ProSe carrier.

Note: Any cell selection state refers to a UE that is out of network coverage and is not associated with a serving cell on any carrier [1].

# 11.2 UE Transmit Timing for ProSe in Any Cell Selection State

## 11.2.1 Introduction

This clause contains requirements on the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery regarding transmit timing if the UE is out of coverage on the carrier used for ProSe operation.

## 11.2.2 ProSe UE transmission timing

The requirements in this subclause are applicable when the reference timing used for deriving ProSe transmission is from another ProSe UE transmitting sidelink synchronization signals.

The sidelink transmissions takes place $(N_{\text{TA, SL}} + N_{\text{TA offset}}) \cdot T_s$ before the reception of the first detected path (in time) of the corresponding timing reference frame from the UE, with $N_{\text{TA offset}} = 0$ and $N_{\text{TA,SL}} = 0$ [16]. The transmission timing error for sidelink transmissions shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified in Table 11.2.2-1.

**Table 11.2.2-1: $T_e$ Timing Error Limit**

| Sidelink Bandwidth (MHz) | $T_e$ |
|---|---|
| ≥1.4 | $24*T_S$ |
| Note: $T_S$ is the basic timing unit defined in TS 36.211 | |

# 11.3 Initiation/Cease of SLSS Transmissions

## 11.3.1 Introduction

The requirements in this subclause apply when the conditions for SLSS transmissions specified in [2] are met and if *syncTxThreshOoC* is included in the preconfigured ProSe parameters.

## 11.3.2 Requirements

The UE shall be capable of measuring the S-RSRP of the selected SyncRef UE used to derive transmission timing for Prose Direct Communication and/or ProSe Direct Discovery and evaluate it to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$ = 0.8 seconds.

If higher layer filtering for S-RSRP measurements is pre-configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the selected SyncRef UE [2] used to derive transmission timing for ProSe Direct Communication and/or ProSe Direct Discovery:

- S-RSRP related side conditions given in Section 11.5 for a corresponding Band are fulfilled,
- ProSe SCH_RP and SCH Ês/Iot according to Annex B.5.1 for a corresponding Band are fulfilled.

# 11.4 Measurements for ProSe in Any Cell Selection State

## 11.4.1 Introduction

This clause contains requirements for E-UTRA cell identification for the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery if the UE is out of coverage on the carrier used for ProSe operation.

The UE can be preconfigured with ProSe resources for out of coverage ProSe operation.

The requirements in this section are applicable for the ProSe if the UE is out of coverage on the carrier used for ProSe operation using the preconfigured ProSe resources. The ProSe UE shall:

- continuously search for any detectable E-UTRA cell on the donwlink carrier frequency associated with the preconfigured ProSe carrier frequency for out of coverage ProSe operation, and
- if in any cell selection state, then search cells also on other carriers and perform cell selection according to the procedure specified in section 4.1.

## 11.4.2 Requirements

### 11.4.2.1 E-UTRA FDD

The requirements in this subclause are applicable when the preconfigured ProSe carrier is FDD (parameter *tdd-ConfigSL* is configured as *none*).

The UE capable of ProSe Direct Communication and/or ProSe Direct Discovery immediately upon being out of coverage on the ProSe carrier shall search for any detectable cell on the carrier preconfigured with ProSe resources.

The UE shall be able to identify a newly detectable E-UTRA FDD cell on the downlink carrier frequency associated with the preconfigured with ProSe carrier frequency:

- within $T_{basic_identify_OoC_ProSe\ Tx_ON}$ if the UE is performing ProSe transmissions on the sidelink, or
- within $T_{basic_identify_OoC_ProSe\ Tx_OFF}$ if the UE is not performing ProSe transmissions on the sidelink.

where,

$T_{basic_identify_OoC_ProSe\ Tx_ON}$ = 6.4 seconds, and

$T_{basic_identify_OoC_ProSe\ Tx_OFF}$ = 32 seconds.

An E-UTRA cell is considered detectable provided it meets the intra-frequency cell identification conditions specified in section 8.1.2.2.

### 11.4.2.2 E-UTRA TDD

The requirements in this subclause are applicable when the preconfigured ProSe carrier is configured as TDD.

The UE capable of ProSe Direct Discovery immediately upon being out of coverage on the ProSe carrier shall search for any detectable cell on the carrier preconfigured with ProSe resources.

The UE shall be able to identify a newly detectable E-UTRA TDD cell on TDD carrier frequency preconfigured for ProSe operation:

- within $T_{basic_identify_OoC_ProSe\ Tx_ON}$ if the UE is performing ProSe transmissions on the sidelink, or
- within $T_{basic_identify_OoC_ProSe\ Tx_OFF}$ if the UE is not performing ProSe transmissions on the sidelink.

where,

$T_{basic_identify_OoC_ProSe\ Tx_ON}$ = 6.4 seconds, and

$T_{basic_identify_OoC_ProSe\ Tx_OFF}$ = 32 seconds.

An E-UTRA cell is considered detectable provided it meets the intra-frequency cell identification conditions specified in section 8.1.2.2.

The UE shall be allowed to interrupt ProSe Direct Discovery operation in order to meet the requirements in this subclause.

# 11.5 Selection / Reselection of ProSe Synchronization Reference

## 11.5.1 Introduction

This clause contains requirements for the measurements performed by the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery if the UE is out of coverage on the carrier used for ProSe operation.

## 11.5.2 Selection/Reselection to intra-frequency SyncRef UE

### 11.5.2.1 Introduction

This clause contains requirements for the measurement for the ProSe synchronization on the UE capable of ProSe Direct Communication and/or ProSe Direct Discovery if the UE is out of coverage on the carrier used for ProSe operation.

### 11.5.2.2 Requirements

The UE shall be able to identify newly detectable SyncRef UE within $T_{detect,SyncRef\ UE}$ seconds if SyncRef UE meets the selection / reselection criterion defined in TS 36.331 [2].

ProSe synchronization source, SyncRef UE, is defined as a ProSe synchronization source which is capable to transmit ProSe synchronization signals.

A SyncRef UE is considered to be detectable when

- S-RSRP related side conditions given in Section 9.9.2 are fulfilled for a corresponding Band,
- ProSe SCH_RP and SCH Ês/Iot are fulfilled according to Annex B.5.3 for a corresponding Band.

$T_{detect,SyncRef\ UE}$ is defined as 20 seconds at SCH Es/Iot $\geq$ -4 dB, provided that the ProSe UE is allowed to drop a maximum of 2% of its ProSe Direct Communication and ProSe Direct Discovery transmissions at the physical layer for the purpose of SyncRef UE selection / reselection.

The UE capable of ProSe Direct Communication and/or ProSe Direct Discovery shall be capable of performing S-RSRP measurements for 6 identified ProSe synchronization sources with the measurement period of 400 ms. It is assumed that the ProSe synchronization sources do not drop or delay more than one SLSS transmission within the measurement period. Otherwise, the measurement period may be extended.

# 11.6 Void

# 11.7 Selection / Reselection of ProSe relay UE

## 11.7.1 Introduction

This section contains the requirements related to selection and reselection of ProSe relay UE when the remote UE is out of coverage on the frequency used for ProSe Direct Communication.

The requirements apply for the selection and reselection of candidate relay UEs that are transmitting relay discovery signals within the discovery resource pool as configured for the remote UE, and follow a synchronization source that either the same or is synchronized to the one use by remote UE.

## 11.7.2 Selection / Reselection of intra-frequency ProSe relay UE

For a remote UE configured by upper layer for relay operation, the remote UE shall search for candidate relay UEs for selection and/or reselection every discovery period.

If the remote UE has a selected sidelink relay UE, then the remote UE shall measure the SD-RSRP of the selected relay once in every four discovery periods and evaluate if it meets the relay selection criterion as defined in [TS 36.331, 5.10.11.4].

The remote UE shall measure SD-RSRP of the candidate relay UEs every $T_{measure,\ ProSe_Relay_Intra}$ for intra-frequency relay UEs that are detected and measured according to the measurement rules.

For an intra-frequency relay UEs that are detected, but that has not been selected or reselected to, the remote UE shall be capable of evaluating that the intra-frequency relay UE has met selection or reselection criterion defined in [2, 5.10.11.4] within $T_{evaluate,ProSe_Relay_Intra}$ as specified in table 11.7.2-1.

The minimum requirements are required to meet when the selected and candidate relay UEs are transmitting relay discovery message every discovery period.

**Table 11.7.2-1: $T_{measure,\ ProSe_Relay_Intra}$ and $T_{evaluate,\ ProSe_Relay_intra}$**

| Discovery Period [s] | $T_{measure,ProSe_Relay_Intra}$ [s] (number of discovery periods) | $T_{evaluate,\ ProSe_Relay_intra}$ [s] (number of discovery periods) |
|---|---|---|
| 0.04≤Discovery period≤10.24 | Note 1 (4) | Note 1 (16) |
| NOTE 1: Time depends upon the configured Discovery period. | | |

# 12 V2V Sidelink Communication Requirements for V2V Operation on Dedicated V2V Carrier

## 12.1 Introduction

This section contains the requirements for the UE capable of V2V sidelink communication under the following conditions:

- no cell operates on the carrier used for the V2V sidelink communcation and
- no configuration related to V2V communication is received by the UE from the serving cell.

## 12.2 Transmit Timing

This clause contains requirements regarding transmit timing for the UE capable of V2V sidelink communication under the following additional condition:

- the UE is pre-configured with parameters for enabling the UE to acquire timing synchronization.

### 12.2.1 GNSS as timing reference

The requirements in this subclause are applicable when the reference timing used by the UE for V2V communication is derived from GNSS signals.

The sidelink transmissions takes place $(N_{TA,\ SL} + N_{TA\ offset}) \cdot T_s$ before the subframe starting boundary derived from subclause 5.10.14 of TS 36.331 [2], where $N_{TAoffset} = 0$ and $N_{TA,SL} = 0$. The transmission timing error for sidelink transmissions shall be less than or equal to $\pm T_e$ where the timing error limit value $T_e$ is specified as 12*Ts and Ts is the basic timing unit defined in TS 36.211.

## 12.3 Interruption

This clause contains interruption requirements for the UE capable of V2V sidelink communication under the following additional conditions:

- the UE is pre-configured with parameters for enabling the UE to acquire timing synchronization
- the UE has dedicated transmitter chain and dedicated receiver chain for the V2V operation
- the UE performs independent concurrent E-UTRAN operation in an E-UTRA band and stand-alone V2V sidelink operation.

The UE shall not cause any interruption on the serving cell when receiving or transmitting V2V sidelink communication signals.

## 12.4 Reliability of GNSS signal

This clause contains requirements regarding reliability of GNSS signal for the UE capable of V2V sidelink communication under the following additional condition:

- the UE is pre-configured with parameters for enabling the UE to acquire the GNSS synchronization.

If UE considers GNSS is a reliable synchronization reference, the UE shall meet timing accuracy requirement as specified in 12.2 and frequency accuracy requirement as specified in 6.5.1G of TS36.101.

# 13 V2X Requirements

## 13.1 Introduction

This section contains the requirements for the UE capable of V2X sidelink communication when the UE is out of coverage on the carrier used for V2X sidelink operation, as defined in [1]. The requirements apply when the UE is:

- in any cell selection state, or,
- out of coverage on the V2X sidelink carrier and is associated with a serving cell on a non-V2X sidelink carrier.

Note: Any cell selection state refers to a UE that is out of network coverage and is not associated with a serving cell on any carrier [1].

Note: When a UE in RRC_CONNECTED state is performing transmissions and/or reception for V2X sidelink communication, the UE shall meet all the requirements specified in Section 8 assuming that UE has a dedicated RX/TX chain for V2X sidelink communication. Otherwise, the UE may interrup the V2X sidelink communication in order to meet the measurement requirements specified in Section 8.

## 13.2 UE Transmit Timing

### 13.2.1 Introduction

This clause contains requirements of transmission timing for V2X sidelink communication when:

- GNSS is used as the synchronization reference source;
- Serving cell/PCell is used as the synchronization reference source;
- SyncRef UE is used as the synchronization reference source.

### 13.2.2 GNSS as synchronization reference source

The requirements in this subclause are applicable when the reference timing used by the UE for V2X sidelink communication is derived from GNSS.

The sidelink transmissions takes place $(N_{\text{TA, SL}} + N_{\text{TA offset}}) \cdot T_s$ before the subframe starting boundary as defined in Clause 5.10.14 of TS 36.331 [2], where $N_{\text{TAoffset}} = 0$ and $N_{\text{TA,SL}} = 0$.

The transmission timing error requirements for sidelink transmissions in Section 12.2 as specified for V2V Sidelink Communication shall apply.

### 13.2.3 Serving cell/PCell as synchronization reference source

The requirements in this subclause are applicable when the reference timing used for Sidelink transmissions is the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) on a non-V2X sidelink carrier.

The sidelink transmissions takes place $(N_{\text{TA, SL}} + N_{\text{TA offset}}) \cdot T_s$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell, where $N_{\text{TAoffset}} = 0$ and $N_{\text{TA,SL}} = 0$.

The requirements in Section 7.1 as specified for PRACH transmissions shall apply.

### 13.2.4 SyncRef UE as synchronization reference source

The requirements in this subclause are applicable when the reference timing used for deriving sidelink transmission is from SyncRef UE transmitting sidelink synchronization signals.

The sidelink transmissions takes place $(N_{\text{TA, SL}} + N_{\text{TA offset}}) \cdot T_s$ before the reception of the first detected path (in time) of the corresponding timing reference frame from the SyncRef UE, where $N_{\text{TAoffset}} = 0$ and $N_{\text{TA,SL}} = 0$.

The requirements in Section 11.2 as specified for ProSe in Any Cell Selection State shall apply.

## 13.3 Initiation/Cease of SLSS Transmissions

### 13.3.1 Introduction

The requirements in this subclause are applicable to the UE capable of V2X sidelink communication when:

- GNSS is used as the synchronization reference source;
- Serving cell / PCell is used as the synchronization reference source;
- SyncRef UE is used as the synchronization reference source.

#### 13.3.1.1 Initiation/Cease of SLSS transmissions with Serving cell / PCell as synchronization reference source

The requirements apply when the Serving cell / PCell is used as synchronization reference source and when the UE is

- out of coverage on the V2X sidelink carrier and in-coverage with a serving cell on a non-V2X sidelink carrier,

and when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType21*. The UE shall be capable of measuring the RSRP of the cell used as synchronization reference source to evaluate to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$

where,

- $T_{evaluate,SLSS}$ = 0.4 seconds when UE is not configured with DRX.
- $T_{evaluate,SLSS}$ = as specified in Table 13.3.1.1-1 when UE is configured with DRX.

**Table 13.3.1.1-1: $T_{evaluate,SLSS}$ with V2X sidelink communication**

| DRX cycle length [s] | $T_{evaluate,SLSS}$ [s] (number of DRX cycles) |
|---|---|
| ≤0.04 | 0.4 (Note 1) |
| 0.04<DRX-cycle≤2.56 | Note 2 (6) |
| Note1: Number of DRX cycles depends upon the DRX cycle in use<br>Note2: Time depends upon the DRX cycles in use | |

If higher layer filtering is configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the cell as synchronization reference source:

- RSRP related side conditions given in Sections 9.1.2.1 and 9.1.2.2 and RSRQ related side conditions given in Clause 9.1.5.1 for a corresponding Band are fulfilled,
- SCH_RP and SCH Ês/Iot according to Annex B.2.1 for a corresponding Band are fulfilled.

#### 13.3.1.2 Initiation/Cease of SLSS transmissions with GNSS as synchronization reference source

The requirements apply when GNSS is used as synchronization reference source and when the UE is

- out of coverage on the V2X sidelink carrier and in-coverage with a serving cell on a non-V2X sidelink carrier,

and when the conditions for SLSS transmissions specified in [2] are met; *networkControlledSyncTx* is not configured; and *syncTxThreshIC* is included in *SystemInformationBlockType21*.

The requirements in Section 13.3.1.1 shall apply.

#### 13.3.1.3 Initiation/Cease of SLSS transmissions with SyncRef UE as synchronization reference source

The requirements apply when SyncRef UE is used as synchronization reference source and when the UE is

- in any cell selection state, or
- out of coverage on the V2X sidelink carrier and is associated with a serving cell on a non-V2X sidelink carrier,

and when the conditions for SLSS transmissions specified in [2] are met and when SyncRef UE is used as synchronization reference source and if *syncTxThreshOoC* is included in the preconfigured V2X parameters.

The UE shall be capable of measuring the S-RSRP of the selected SyncRef UE used as synchronization reference source and evaluate it to initiate/cease SLSS transmissions within $T_{evaluate,SLSS}$ = 0.64 seconds.

If higher layer filtering for S-RSRP measurements is pre-configured, an additional delay in evaluation to initiate/cease SLSS transmissions can be expected.

For the selected SyncRef UE [2] used to derive transmission timing for V2X sidelink communication:

- S-RSRP related side conditions given in Section 13.4 for a corresponding Band are fulfilled,
- V2X SCH_RP and SCH Ês/Iot according to Annex B.6.4 for a corresponding Band are fulfilled.

## 13.4 Selection / Reselection of V2X Synchronization Reference Source

The requirements defined in section 13.4 do not apply to the UEs that do not support transmission and reception of SLSS.

A V2X SyncRef UE is considered to be detectable when

- S-RSRP related side conditions given in Section 9.10.2 are fulfilled for a corresponding Band,
- V2X SCH_RP and SCH Ês/Iot according to Annex B.6.4 for a corresponding Band are fulfilled.

When GNSS synchronization reference source is configured as the highest priority and

- UE is synchronized to GNSS directly,
  - UE shall not drop any V2X SLSS and data transmission for the purpose of selection/reselection to the SyncRef UE.
- UE is synchronized to a SyncRef UE that is synchronized to GNSS directly or in-directly,
  - UE shall not drop any V2X data transmission for the purpose of selection/reselection to the SyncRef UE. The UE shall be able to identify newly detectable intra-frequency V2X SyncRef UE within $T_{detect,SyncRef\ UE_V2X}$ seconds if the V2X SyncRef UE meets the selection / reselection criterion defined in TS 36.331 [2]. $T_{detect,SyncRef\ UE_V2X}$ is defined as 1.6 seconds at SCH Es/Iot ≥0 dB, provided that the UE is allowed to drop a maximum of 30% of its SLSS transmissions during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.
- in other case
  - The UE shall be able to identify newly detectable intra-frequency V2X SyncRef UE within $T_{detect,SyncRef\ UE_V2X}$ seconds if the SyncRef UE meets the selection / reselection criterion defined in TS 36.331 [2]. $T_{detect,SyncRef\ UE_V2X}$ is defined as 8 seconds at SCH Es/Iot ≥0 dB, provided that the UE is allowed to drop a maximum of 6% of its V2X data and SLSS transmissions during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection /

reselection to the SyncRef UE. UE is allowed to drop up to 2 subframes of its V2X data reception per PSBCH monitoring occasion and overall drop rate shall not exceed 0.3% of its V2X data reception during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

When serving cell/PCell synchronization reference source is configured as the highest priority,

- UE shall be able to identify newly detectable intra-frequency V2X SyncRef UE within $T_{detect,SyncRef\ UE_V2X}$ seconds if the SyncRef UE meets the selection / reselection criterion defined in TS 36.331 [2]. $T_{detect,SyncRef\ UE_V2X}$ is defined as 8 seconds at SCH Es/Iot $\geq$ 0 dB, provided that the V2X UE is allowed to drop a maximum of 6% of its V2X data and SLSS transmissions for the purpose of selection / reselection to the SyncRef UE. UE is allowed to drop up to 2 subframes of its V2X data reception per PSBCH monitoring occasion and overall drop rate shall not exceed 0.3% of its V2X data reception during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

UE shall be capable of performing S-RSRP measurements for 3 identified intra-frequency V2X SyncRef UE with the measurement period of 320 ms. It is assumed that the V2X SyncRef UE do not drop or delay any SLSS transmission within the measurement period. Otherwise, the measurement period may be extended.

When UE is synchronized to GNSS directly, before selection / reselection of the new synchronization reference source UE shall evaluate the GNSS synchronization source reliability for at least 20 seconds before changing the synchronization reference from GNSS to another synchronization reference source. UE shall be always synchronized to GNSS directly during the evaluation of GNSS synchronization source reliability.

# 13.5 Autonomous Resource Selection/Reselection measurements

## 13.5.1 Introduction

This section contains the requirements related to autonomous resource selection/reselection of the UE capable of V2X sidelink communication.

## 13.5.2 PSSCH-RSRP measurements

The UE physical layer shall be capable of performing the PSSCH-RSRP measurements [4] on the carrier operating V2X sidelink communication for determining the subset of resources to be excluded in PSSCH resource selection in sidelink transmission mode 4. The PSSCH-RSRP measurement period corresponds to one sub-frame and the measurement shall meet the PSSCH-RSRP measurement accuracy requirement in Section 9.10.

## 13.5.3 S-RSSI measurements

The UE physical layer shall be capable of performing the S-RSSI measurements [4] on the carrier operating V2X sidelink communication for determining the subset of resources to be excluded in PSSCH resource selection in sidelink transmission mode 4. The S-RSSI measurement period corresponds to 1 second and the filtered measurement shall meet the S-RSSI measurement accuracy requirement in Section 9.10.

# 13.6 Congestion Control measurements

The UE shall be capable of estimating the channel busy ratio for one or more transmission pools indicated by higher layers [2], based on S-RSSI measurements provided by the physical layer.

When no sidelink transmissions occur, the UE physical layer shall perform a single-shot S-RSSI measurement for each sub-channel included in all the subframes configured as transmission pools.

The S-RSSI measurement performed according to this section shall meet the S-RSSI measurement accuracy requirements defined in Section 9.10.4.

The UE shall perform channel busy ratio (CBR) measurement based on S-RSSI measurements as described in TS 36.214 [4].

# 13.7 Interruption

## 13.7.1 Interruptions to WAN due to V2X Sidelink Communication

This sub-clause contains the requirements related to the interruptions on the serving cell(s) due to V2X sidelink communication.

A UE capable of V2X sidelink communication may indicate its interest (initiation or termination) in V2X sidelink communication to the connected eNodeB using IE *SidelinkUEInformation* [2].

The UE is allowed an interruption of up to 1 subframe on the serving cell(s) during the RRC reconfiguration procedure that includes the V2X sidelink communication configuration message *sl-V2X-ConfigDedicated* [2] (setup and release). This interruption is for both uplink and downlink of the serving cell(s).

## 13.7.2 V2X Sidelink Communication Dropping due to synchronization reference source change

This sub-clause contains the requirements related to the interruptions on the V2X sidelink communication due to synchronization source change.

UE is allowed to drop V2X sidelink signal transmission or reception for up to 1 subframe when synchronization reference source is changed:

- from GNSS
  - to Serving cell/PCell;
  - to SyncRef UE that is not synchronized to GNSS directly or in-directly;
- from SyncRef UE that is synchronized to GNSS directly or in-directly
  - to Serving cell/PCell;
  - to SyncRef UE that is not synchronized to GNSS directly or in-directly;
- from Serving cell/PCell
  - to GNSS
  - to SyncRef UE that is synchronized to GNSS directly or in-directly;
- from SyncRef UE that is not synchronized to GNSS directly or in-directly
  - to GNSS;
  - to SyncRef UE that is synchronized to GNSS directly or in-directly;

UE is allowed to interruption any V2X sidelink signals including PSSCH, PSCCH, PSBCH and SLSS signals.

## 13.7.3 Interruptions to WAN due to V2X Carrier Aggregation

This sub-clause contains the requirements related to the interruptions on the serving cell/PCell due to V2X component carrier addition/release.

When any number of component carriers is added or released for V2X carrier aggregation using the same *RRCConnectionReconfiguratio*n message as defined in TS 36.331 [2], the UE capable of V2X sidelink communication is allowed an interruption of up to 2 subframes to WAN. This interruption is for both uplink and downlink of serving cell/PCell.

Upon receiving V2X carrier addition/release command by using the RRCConnectionReconfiguration message that includes sl-V2X-ConfigDedicated in WAN subframe n, the interruption to WAN shall not occur before in WAN subframe n+5 and no later than in WAN subframe n + 21+N, where N is the number of component carrier added/released.

### 13.7.4 Interruptions to WAN due to NR V2X sidelink communication

This sub-clause contains the requirements related to the interruptions on the PCell due to NR V2X sidelink communication.

A UE capable of NR V2X sidelink communication may indicate its interest (initiation or termination) in NR V2X sidelink communication to the connected eNodeB using IE *SidelinkUEInformation*.

The UE is allowed an interruption of up to [2] subframes on the PCell during the RRC reconfiguration procedure that includes the NR V2X sidelink communication configuration message *sl-V2X-ConfigDedicated* (setup and release). This interruption is for both uplink and downlink of the PCell.

## 13.8 Reliability of GNSS signal

This clause contains requirements regarding reliability of GNSS signal for the UE capable of V2X sidelink communication under the following additional condition:

- The UE is configured or pre-configured with parameters for enabling the UE to acquire the GNSS synchronization.

If UE considers GNSS is a reliable synchronization reference, the UE shall meet timing accuracy requirement as specified in 12.2 and frequency accuracy requirement as specified in 6.5.1G of TS36.101. Otherwise, the UE shall be capable to select another synchronization reference source.

## 13.9 Component Carrier Addition and Release Delay for V2X Sidelink Carrier Aggregation

The requirements in this subclause are applicable to UE configured in sidelink transmission mode 3.

Upon receiving V2X carrier addition/release command by using the RRCConnectionReconfiguration message that includes sl-V2X-ConfigDedicated in WAN subframe n, UE shall accomplish the V2X component carrier addition/release no later than the end of WAN subframe n + 21+N, where N is the number of component carrier added/released.

NOTE: For UE configured in sidelink transmission mode 4, the delay is up to UE implementation.

## 13.10 Selection / Reselection of V2X Synchronization Reference Source for V2X Carrier Aggregation

Requirements in this clause are applicable to UE supporting V2X sidelink carrier aggregation.

When the UE is synchronized to a SyncRef UE in a carrier and required only to search other SyncRef UEs in the synchronized carrier, the UE shall be able to identify a newly detectable V2X SyncRef UE within $T_{detect,SyncRef\ UE_V2X}$ if the SyncRef UE meets the selection/reselection criterion defined in TS 36.331 [2]. UE shall be capable of performing S-RSRP measurements for 3 identified V2X SyncRef UE with the measurement period of 320 ms.

When the synchronization reference source for V2X sidelink carrier aggregation is lost and has to search SyncRef UE on the aggregated carriers which are configured as synchronization carrier, the UE shall be able to identify a newly detectable V2X SyncRef UE within $N \times T_{detect,SyncRef\ UE_V2X}$ if the SyncRef UE meets the selection/reselection criterion defined in TS 36.331 [2]. UE shall be capable of performing S-RSRP measurements for 3 identified V2X SyncRef UE per carrier with the measurement period of N×320 ms.

It is assumed that the identified V2X SyncRef UE does not drop or delay any SLSS transmission within the measurement period. Otherwise, the measurement period may be extended.

When GNSS synchronization reference source is configured as the highest priority and

- UE is synchronized to a SyncRef UE that is synchronized to GNSS directly or in-directly,
  - The value of $T_{detect,SyncRef\ UE_V2X}$ is as 1.6 seconds at SCH Es/Iot $\geq$0 dB, provided that the UE is allowed to drop a maximum of 30% of its SLSS transmissions on each carrier operating V2X sidelink communication during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

- in other case

    - The value of $T_{detect,SyncRef\ UE_V2X}$ is as 8 seconds at SCH Es/Iot ≥0 dB, provided that the UE is allowed to drop a maximum of 6% of its SLSS transmissions on each carrier operating V2X sidelink communication during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

    - UE is allowed to drop up to 2 subframes of its V2X data reception on each carrier operating V2X sidelink communication per PSBCH monitoring occasion and overall drop rate shall not exceed 0.3% of its V2X data reception during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

When serving cell/PCell synchronization reference source is configured as the highest priority,

- The value of $T_{detect,SyncRef\ UE_V2X}$ is as 8 seconds at SCH Es/Iot ≥0 dB, provided that the UE is allowed to drop a maximum of 6% of its SLSS transmissions on each carrier operating V2X sidelink communication during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

- UE is allowed to drop up to 2 subframes of its V2X data reception on each carrier operating V2X sidelink communication per PSBCH monitoring occasion and overall drop rate shall not exceed [0.3%] of its V2X data reception during $T_{detect,SyncRef\ UE_V2X}$ for the purpose of selection / reselection to the SyncRef UE.

N is the number of aggregated carriers configured as synchronization carrier.

# Annex A (normative): Test Cases

## A.1 Purpose of annex

This Annex specifies test specific parameters for some of the functional requirements in sections 4 to 9. The tests provide additional information to how the requirements should be interpreted for the purpose of conformance testing. The tests in this Annex are described such that one functional requirement may be tested in one or several test and one test may verify several requirements. Some requirements may lack a test.

The conformance tests are specified in TS 36.521-3 [23]. Statistical interpretation of the requirements is described in Annex A.2.

## A.2 Requirement classification for statistical testing

Requirements in this specification are either expressed as absolute requirements with a single value stating the requirement, or expressed as a success rate. There are no provisions for the statistical variations that will occur when the parameter is tested.

Annex A outlines the tests in more detail and lists the test parameters needed. The test will result in an outcome of a test variable value for the device under test (DUT) inside or outside the test limit. Overall, the probability of a "good" DUT being inside the test limit(s) and the probability of a "bad" DUT being outside the test limit(s) should be as high as possible. For this reason, when selecting the test variable and the test limit(s), the statistical nature of the test is accounted for.

The statistical nature depends on the type of requirement. Some have large statistical variations, while others are not statistical in nature at all. When testing a parameter with a statistical nature, a confidence level is set. This establishes the probability that a DUT passing the test actually meets the requirements and determines how many times a test has to be repeated and what the pass and fail criteria are. Those aspects are not covered by TS 36.133. The details of the tests on how many times to run it and how to establish confidence in the tests are described in TS 36.521-3 [23]. This Annex establishes the variable to be used in the test and whether it can be viewed as statistical in nature or not.

### A.2.1 Types of requirements in TS 36.133

#### A.2.1.1 Time and delay requirements on UE higher layer actions

A very large part of the RRM requirements are delay requirements:

- In E-UTRAN RRC_IDLE state mobility (clause A.4) there is cell re-selection delay.
- In E-UTRAN RRC_CONNECTED state mobility (clauses A.5 and A.8) there is handover delay, cell search delay and measurement reporting delay.
- In RRC Connection Control (clause A.6) there is RRC re-establishment delay.

All have in common that the UE is required to perform an action observable in higher layers (e.g. camp on the correct cell) within a certain time after a specific event (e.g. when a new strong pilot or reference signal appears). The delay time is statistical in nature for several reasons, among others that several of the measurements are performed by the UE in a fading radio environment.

The variations make a strict limit unsuitable for a test. Instead there is a condition set for a correct action by the UE, e.g. that the UE shall camp on the correct cell within X seconds. Then the rate of correct events is observed during repeated tests and a limit is set on the rate of correct events, usually 90% correct events are required. How the limit is applied in the test depends on the confidence required, further detailed are in TS 36.521-3 [23].

### A.2.1.2 Measurements of power levels, relative powers and time

A very large number of requirements are on measurements that the UE performs:

- In E-UTRAN RRC_CONNECTED state mobility (clause A.5) there are measurement reports.
- In Measurement Performance Requirements (clause A.9) there are requirements for all type of measurements.

The accuracy requirements on measurements are expressed in this specification as a fixed limit (e.g. +/-X dB), but the measurement error will have a distribution that is not easily confined in fixed limits. Assuming a Gaussian distribution of the error, the limits will have to be set at +/-3.29σ if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

### A.2.1.3 Implementation requirements

A few requirements are strict actions the UE should take or capabilities the UE should have, without any allowance for deviations. These requirements are absolute and should be tested as such. Examples are:

- "Event triggered report rate" in E-UTRAN RRC_CONNECTED state mobility (clauses A.5 and A.8)
- "Correct behaviour at time-out" in RRC connection control (clause A.6)

### A.2.1.4 Physical layer timing requirements

There are requirements on Timing and Signaling Characteristics (clauses A.7). There are both absolute and relative limits on timing accuracy depending upon the type of requirement. Examples are:

- Initial Transmit Timing (clause A.7.1) has an absolute limit on timing accuracy.
- Timing Advance (clause A.7.2) has a relative limit on timing accuracy.

## A.3 RRM test configurations

## A.3.1 Reference Measurement Channels

### A.3.1.1 PDSCH

#### A.3.1.1.1 FDD

**Table A.3.1.1.1-1: PDSCH Reference Measurement Channels for FDD**

| Parameter | Unit | Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference channel | | R.2 FDD | | R.5 FDD | R.7 FDD | R.0 FDD | R.1 FDD | R.3 FDD | R.4 FDD | R.6 FDD |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 5 | 10 | 10 | 10 | 20 | 20 |
| Number of transmitter antennas | | 1 | | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Allocated resource blocks (Note 4) | | 2 | | 11 | 11 | 24 | 24 | 24 | 24 | 24 |
| Allocated subframes per Radio Frame | | 10 | | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation | | QPSK | | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate | | 1/3 | | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | | | | | | |
| For Sub-Frames 4, 9 | Bits | 120 | | 968 | 968 | 2088 | 2088 | 2088 | 2088 | 2088 |
| For Sub-Frame 5 | Bits | 104 | | 776 | 776 | 2088 | 1736 | 2088 | 2088 | 2088 |
| For Sub-Frame 0 | Bits | 32 | | 616 | 616 | 1736 | 1736 | 1736 | 1736 | 1736 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | | 0 | 968 | 0 | 0 | 2088 | 0 | 2088 |
| Number of Code Blocks per Sub-Frame | | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (Note 5) | | | | | | | | | | |
| For Sub-Frames 4, 9 | | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 5 | | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 0 | | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 0 | | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| Binary Channel Bits Per Sub-Frame | | | | | | | | | | |
| For Sub-Frames 4, 9 | Bits | 456 | | 2772 | 2772 | 6624 | 6336 | 6624 | 6624 | 6624 |
| For Sub-Frame 5 | Bits | 360 | | 2484 | 2484 | 6336 | 6048 | 6336 | 6336 | 6336 |
| For Sub-Frame 0 | Bits | 176 | | 1932 | 1932 | 5784 | 5520 | 5784 | 5784 | 5784 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | | 0 | 2772 | 0 | 0 | 6624 | 0 | 6624 |
| Max. Throughput averaged over 1 frame | kbps | 37.6 | | 332.8 | 913.6 | 800 | 765 | 2053 | 800 | 2053 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.

**Table A.3.1.1.1-2: PDSCH Reference Measurement Channels for FDD with slot duration TTI**

| | Unit | R.8 FDD |
|---|---|---|
| Bandwidth | MHz | 10 |
| Number of transmit antennas | | 1 |
| Allocated resource blocks(Note 4) | | 24 |
| Allocated subframes per Radio Frame | | 10 |
| Modulation | | QPSK |
| Target coding rate | | 1/3 |
| Information Bit Payload | | |
| For Sub-Frame 4, 9 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 5 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 0 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1032 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | |
| Slot index 0 | Bits | 0 |
| Slot index 1 | Bits | 0 |
| Number of Code Blocks per slot (Note 5) | | |
| For Sub-Frame 4, 9 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 5 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 0 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | |
| Slot index 0 | | 0 |
| Slot index 1 | | 0 |
| Binary Channel Bits per slot | | |
| For Sub-Frame 4, 9 | Bits | |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 5 | Bits | |
| Slot index 0 | Bits | 2496 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 0 | Bits | |

| | | |
|---|---|---|
| Slot index 0 | Bits | 2496 |
| Slot index 1 | Bits | 3288 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | |
| Slot index 0 | Bits | 0 |
| Slot index 1 | Bits | 0 |
| Max. Throughput averaged over 1 frame | kbps | 819.2 |
| Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.<br>Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].<br>Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].<br>Note 4: Allocation is located in the middle of bandwidth.<br>Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)<br>Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.<br>Note 7: Note SPDCCH is transmitted outside allocated resource blocks | | |

**Table A.3.1.1.1-3: PDSCH Reference Measurement Channels for FDD with subslot duration TTI**

| | Unit | R.9 FDD |
|---|---|---|
| Bandwidth | MHz | 10 |
| Number of transmit antennas | | 1 |
| Allocated resource blocks(Note 4) | | 24 |
| Allocated subframes per Radio Frame | | 10 |
| Modulation | | QPSK |
| Target coding rate | | 1/3 |
| Information Bit Payload | | |
| For Sub-Frame 4, 9 | | |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 344 |
| Subslot index 3 | Bits | 344 |
| Subslot index 4 | Bits | 344 |
| Subslot index 5 | Bits | 504 |
| For Sub-Frame 5 | | |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 288 |
| Subslot index 3 | Bits | 344 |
| Subslot index 4 | Bits | 344 |
| Subslot index 5 | Bits | 504 |
| For Sub-Frame 0 | | |
| Subslot index 1 | Bits | 504 |
| Subslot index 2 | Bits | 288 |
| Subslot index 3 | Bits | 224 |
| Subslot index 4 | Bits | 288 |
| Subslot index 5 | | 504 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | |
| Subslot index 1 | Bits | 0 |
| Subslot index 2 | Bits | 0 |
| Subslot index 3 | Bits | 0 |
| Subslot index 4 | Bits | 0 |
| Subslot index 5 | Bits | 0 |
| Number of Code Blocks per Sub-Frame(Note 5) | | |
| For Sub-Frame 4, 9 | | |
| Subslot index 1 | | 1 |
| Subslot index 2 | | 1 |
| Subslot index 3 | | 1 |
| Subslot index 4 | | 1 |
| Subslot index 5 | | 1 |
| For Sub-Frame 5 | | |
| Subslot index 1 | | 1 |
| Subslot index 2 | | 1 |
| Subslot index 3 | | 1 |
| Subslot index 4 | | 1 |

| | | |
|---|---|---|
| Subslot index 5 | | 1 |
| For Sub-Frame 0 | | |
| Subslot index 1 | | 1 |
| Subslot index 2 | | 1 |
| Subslot index 3 | | 1 |
| Subslot index 4 | | 1 |
| Subslot index 5 | | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | |
| Subslot index 1 | | 0 |
| Subslot index 2 | | 0 |
| Subslot index 3 | | 0 |
| Subslot index 4 | | 0 |
| Subslot index 5 | | 0 |
| Binary Channel Bits per subslot | | |
| For Sub-Frame 4, 9 | Bits | |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 1152 |
| Subslot index 3 | Bits | 1056 |
| Subslot index 4 | Bits | 1152 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 5 | Bits | |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 864 |
| Subslot index 3 | Bits | 1056 |
| Subslot index 4 | Bits | 1152 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 0 | Bits | |
| Subslot index 1 | Bits | 1632 |
| Subslot index 2 | Bits | 864 |
| Subslot index 3 | Bits | 792 |
| Subslot index 4 | Bits | 864 |
| Subslot index 5 | Bits | 1632 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | |
| Subslot index 1 | Bits | 0 |
| Subslot index 2 | Bits | 0 |
| Subslot index 3 | Bits | 0 |
| Subslot index 4 | Bits | 0 |
| Subslot index 5 | Bits | 0 |
| Max. Throughput averaged over 1 frame | kbps | 787.2 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.
Note 7: Note SPDCCH is transmitted outside allocated resource blocks

### A.3.1.1.2 TDD

**Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for TDD UL/DL configuration1**

| Parameter | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| Reference channel | | R.2 TDD | | R.4 TDD | R.0 TDD | R.1 TDD | R.3 TDD |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 10 | 20 |
| Number of transmitter antennas | | 1 | | 1 | 1 | 2 | 1 |
| Allocated resource blocks (Note 4) | | 2 | | 11 | 24 | 24 | 24 |
| Uplink-Downlink Configuration (Note 5) | | 1 | | 1 | 1 | 1 | 1 |
| Special Subframe Configuration (Note 6) | | 6 | | 6 | 6 | 6 | 6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Allocated subframes per Radio Frame | | 6 | | 6 | 6 | 6 | 6 |
| Modulation | | QPSK | | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate | | 1/3 | | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | | | |
| For Sub-Frames 4,9 | Bits | 120 | | 968 | 2088 | 2088 | 2088 |
| For Sub-Frame 5 | Bits | 104 | | 968 | 2088 | 2088 | 2088 |
| For Sub-Frame 0 | Bits | 56 | | 616 | 2088 | 1736 | 2088 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 56 | | 552 | 1032 | 1032 | 1032 |
| Number of Code Blocks per Sub-Frame (Note 7) | | 1 | | 1 | 1 | 1 | 1 |
| For Sub-Frames 4,9 | | 1 | | 1 | 1 | 1 | 1 |
| For Sub-Frame 5 | | 1 | | 1 | 1 | 1 | 1 |
| For Sub-Frame 0 | | 1 | | 1 | 1 | 1 | 1 |
| For Sub-Frame 1, 6 (DwPTS) | | 1 | | 1 | 1 | 1 | 1 |
| Binary Channel Bits Per Sub-Frame | | | | | | | |
| For Sub-Frames 4,9 | Bits | 456 | | 2772 | 6624 | 6336 | 6624 |
| For Sub-Frame 5 | Bits | 408 | | 2628 | 6480 | 6192 | 6480 |
| For Sub-Frame 0 | Bits | 224 | | 2076 | 5928 | 5664 | 5928 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 272 | | 1616 | 3696 | 3504 | 3696 |
| Max. Throughput averaged over 1 frame | Mbps | 0.0512 | | 0.4624 | 1.0416 | 1.0064 | 1.0416 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: As per Table 4.2-2 in TS 36.211 [16]
Note 6: As per Table 4.2-1 in TS 36.211 [16]
Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes.

**Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for TDD UL/DL configuration0**

| Parameter | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| Reference channel | | | | | R.5 TDD | | |
| Channel bandwidth | MHz | 1.4 | 3 | 5 | 10 | 10 | 20 |
| Number of transmitter antennas | | | | | 1 | | |
| Allocated resource blocks (Note 4) | | | | | 24 | | |
| Uplink-Downlink Configuration (Note 5) | | | | | 0 | | |
| Special Subframe Configuration (Note 6) | | | | | 6 | | |
| Allocated subframes per Radio Frame | | | | | 4 | | |
| Modulation | | | | | QPSK | | |
| Target Coding Rate | | | | | 1/3 | | |
| Information Bit Payload | | | | | | | |
| For Sub-Frames 4,9 | Bits | | | | N/A | | |
| For Sub-Frame 5 | Bits | | | | 2088 | | |
| For Sub-Frame 0 | Bits | | | | 2088 | | |
| For Sub-Frame 1, 6 (DwPTS) | Bits | | | | 1032 | | |
| Number of Code Blocks per Sub-Frame (Note 7) | | | | | 1 | | |
| For Sub-Frames 4,9 | | | | | N/A | | |
| For Sub-Frame 5 | | | | | 1 | | |
| For Sub-Frame 0 | | | | | 1 | | |
| For Sub-Frame 1, 6 (DwPTS) | | | | | 1 | | |
| Binary Channel Bits Per Sub-Frame | | | | | | | |
| For Sub-Frames 4,9 | Bits | | | | N/A | | |
| For Sub-Frame 5 | Bits | | | | 6480 | | |
| For Sub-Frame 0 | Bits | | | | 5928 | | |
| For Sub-Frame 1, 6 (DwPTS) | Bits | | | | 3696 | | |
| Max. Throughput averaged over 1 frame | Mbps | | | | 0.624 | | |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: As per Table 4.2-2 in TS 36.211 [16]
Note 6: As per Table 4.2-1 in TS 36.211 [16]
Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes.

**Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for TDD slot duration TTI**

| | Unit | R.6 TDD |
|---|---|---|
| Bandwidth | MHz | 10 |
| Number of transmit antennas | | 1 |
| Allocated resource blocks(Note 4) | | 24 |
| Uplink-Downlink Configuration (Note 5) | | 1 |
| Special Subframe Configuration (Note 6) | | 6 |
| Allocated subframes per Radio Frame | | 6 |
| Modulation | | QPSK |
| Target coding rate | | 1/3 |
| Information Bit Payload | | |
| For Sub-Frame 4, 9 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 5 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1224 |
| For Sub-Frame 0 | | |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | 1032 |
| For Sub-Frame 1, 6 (DwPTS) | | (1032) |
| Slot index 0 | Bits | 872 |
| Slot index 1 | Bits | N/A |
| Number of Code Blocks per Sub-Frame | | |
| For Sub-Frame 4, 9 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 5 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 0 | | |
| Slot index 0 | | 1 |
| Slot index 1 | | 1 |
| For Sub-Frame 1, 6 (DwPTS) | | |
| Slot index 0 | | 1 |
| Slot index 1 | | N/A |
| Binary Channel Bits per slot | | |
| For Sub-Frame 4, 9 | Bits | |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3840 |
| For Sub-Frame 5 | Bits | |
| Slot index 0 | Bits | 2784 |
| Slot index 1 | Bits | 3696 |
| For Sub-Frame 0 | Bits | |
| Slot index 0 | Bits | 2640 |
| Slot index 1 | Bits | 3288 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | |
| Slot index 0 | Bits | 2640 |
| Slot index 1 | Bits | N/A |
| Max. Throughput averaged over 1 frame | kbps | 999.6 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: As per Table 4.2-2 in TS 36.211 [16]
Note 6: As per Table 4.2-1 in TS 36.211 [16]
Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes.
Note 9: SPDCCH is transmitted outside allocated resource blocks

### A.3.1.1.3 FDD for UE category 0

**Table A.3.1.1.3-1: PDSCH Reference Measurement Channels for FDD**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| Reference channel | | R.13 FDD | R.14 FDD | R.15 FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 | 2 |
| Allocated resource blocks (Note 4) | | 24 | 24 | 24 |
| Allocated subframes per Radio Frame | | 10 | 10 | 10 |
| Modulation | | QPSK | QPSK | QPSK |
| Target Coding Rate | | 1/10 | 1/10 | 1/10 |
| Information Bit Payload | | | | |
| For Sub-Frames 4, 9 | Bits | 648 | 648 | 648 |
| For Sub-Frame 5 | Bits | 648 | 648 | 648 |
| For Sub-Frame 0 | Bits | 648 | 648 | 648 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 | 648 |
| Number of Code Blocks per Sub-Frame (Note 5) | | | | |
| For Sub-Frames 4, 9 | | 1 | 1 | 1 |
| For Sub-Frame 5 | | 1 | 1 | 1 |
| For Sub-Frame 0 | | 1 | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 0 | 0 | 1 |
| Binary Channel Bits Per Sub-Frame | | | | |
| For Sub-Frames 4, 9 | Bits | 6624 | 6336 | 6636 |
| For Sub-Frame 5 | Bits | 6336 | 6048 | 6408 |
| For Sub-Frame 0 | Bits | 5784 | 5520 | 5520 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 | 6636 |
| Max. Throughput averaged over 1 frame | kbps | 259.2 | 259.2 | 648 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.

### A.3.1.1.4 HD-FDD for UE category 0

**Table A.3.1.1.4-1: PDSCH Reference Measurement Channels for HD-FDD**

| Parameter | Unit | | Value |
|---|---|---|---|
| Reference channel | | R.1 HD-FDD | R.2 HD-FDD |
| Channel bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 |

| | | | |
|---|---|---|---|
| Allocated resource blocks (Note 4) | | 24 | 24 |
| Allocated subframes per Radio Frame | | 10 | 10 |
| Modulation | | QPSK | QPSK |
| Target Coding Rate | | 1/10 | 1/10 |
| Information Bit Payload | | | |
| For Sub-Frames 4, 9, | Bits | 0 | 0 |
| For Sub-Frame 5 (Note 7) | Bits | 424 | 424 |
| For Sub-Frame 0 (Note 7) | Bits | 648 | 648 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 |
| Number of Code Blocks per Sub-Frame (Note 5) | | | |
| For Sub-Frames 4, 9 | | 0 | 0 |
| For Sub-Frame 5 | | 1 | 1 |
| For Sub-Frame 0 | | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 0 | 0 |
| Binary Channel Bits Per Sub-Frame | | | |
| For Sub-Frames 4, 9 | Bits | 0 | 0 |
| For Sub-Frame 5 | Bits | 6336 | 6048 |
| For Sub-Frame 0 | Bits | 5784 | 5520 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 0 | 0 |
| Max. Throughput averaged over 1 frame | kbps | - | - |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5 MHz channel BW.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in 3GPP TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.
Note 7: Sub-frame 0 or sub-frame 5 is randomly scheduled in downlink.

### A.3.1.1.5 TDD for UE category 0

**Table A.3.1.1.5-1: PDSCH Reference Measurement Channels for TDD UL/DL configuration1**

| Parameter | Unit | Value | |
|---|---|---|---|
| Reference channel | | R.12 TDD | R.13 TDD |
| Channel bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 |
| Allocated resource blocks (Note 4) | | 24 | 24 |
| Uplink-Downlink Configuration (Note 5) | | 1 | 1 |
| Special Subframe Configuration (Note 6) | | 6 | 6 |
| Allocated subframes per Radio Frame | | 6 | 6 |
| Modulation | | QPSK | QPSK |
| Target Coding Rate | | 1/10 | 1/10 |
| Information Bit Payload | | | |
| For Sub-Frames 4,9 | Bits | 648 | 648 |
| For Sub-Frame 5 | Bits | 648 | 648 |
| For Sub-Frame 0 | Bits | 648 | 648 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 488 | 488 |
| Number of Code Blocks per Sub-Frame (Note 7) | | 1 | 1 |
| For Sub-Frames 4,9 | | 1 | 1 |
| For Sub-Frame 5 | | 1 | 1 |
| For Sub-Frame 0 | | 1 | 1 |
| For Sub-Frame 1, 6 (DwPTS) | | 1 | 1 |
| Binary Channel Bits Per Sub-Frame | | | |
| For Sub-Frames 4,9 | Bits | 6624 | 6336 |
| For Sub-Frame 5 | Bits | 6580 | 6192 |
| For Sub-Frame 0 | Bits | 5928 | 5664 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 3696 | 3408 |
| Max. Throughput averaged over 1 frame | Mbps | 0.3552 | 0.3552 |

Note 1: 2 symbols allocated to PDCCH for 10 MHz channel BW. 3 OFDM symbols allocated to PDCCH for 5MHz channel BW. 4 symbols allocated to PDCCH for 1.4 MHz channel BW. For special subframe (1 & 6) only 2 OFDM symbols are allocated to PDCCH for all bandwidths.
Note 2: Reference signal, synchronization signals and PBCH allocated as defined in TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: As per Table 4.2-2 in TS 36.211 [16]
Note 6: As per Table 4.2-1 in TS 36.211 [16]
Note 7: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 8: PDSCH allocation applies only to subframes not configured as PRS subframes.

### A.3.1.1.6 Frame Structure 3

**Table A.3.1.1.6-1: PDSCH Reference Measurement Channels for FS 3**

| Parameter | Unit | Value | | | | |
|---|---|---|---|---|---|---|
| Reference channel | | | | | R.0 FS3 | R.1 FS3 |
| Channel bandwidth | MHz | | | | 20 | 20 |
| Number of transmitter antennas | | | | | 1 | 1 |
| Allocated resource blocks (Note 4) | | | | | 24 | 24 |
| Allocated subframes per Radio Frame | | | | | 10 | 10 |
| Modulation | | | | | QPSK | QPSK |
| Target Coding Rate | | | | | 1/3 | 1/3 |
| Information Bit Payload | | | | | | |
| For Sub-Frames 4, 9 | Bits | | | | 2088 | 2088 |
| For Sub-Frame 5 | Bits | | | | 2088 | 2088 |
| For Sub-Frame 0 | Bits | | | | 2088 | 2088 (Note 7) |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | | | | 2088 | 0 |
| Number of Code Blocks per Sub-Frame (Note 5) | | | | | | |
| For Sub-Frames 4, 9 | | | | | 1 | 1 |
| For Sub-Frame 5 | | | | | 1 | 1 |
| For Sub-Frame 0 | | | | | 1 | 1 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | | | | 1 | 1 |
| Binary Channel Bits Per Sub-Frame | | | | | | |
| For Sub-Frames 4, 9 | Bits | | | | 6624 | 6624 |
| For Sub-Frame 5 | Bits | | | | 6336 | 6336 |
| For Sub-Frame 0 | Bits | | | | 6336 | 6336 |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | | | | 6624 | 0 |
| Max. Throughput averaged over 1 frame | kbps | | | | 2088 | 2088 |

Note 1: 2 symbols allocated to PDCCH for 20 MHz channel BW.
Note 2: Reference signal, synchronization signals allocated as defined in 3GPP TS 36.211 [16].
Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in 3GPP TS 36.213 [3].
Note 4: Allocation is located in the middle of bandwidth.
Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
Note 6: PDSCH allocation applies only to subframes not configured as PRS subframes.
Note 7: PDSCH allocation applies only to subframes where there is no DRS transmission
Note 8: PDSCH is not transmitted in subframes where it is determined that transmission should not occur according to the listen before talk (LBT model).
Note 9: Max throughput averaged over 1 frame does not account for missed PDSCH transmission due to LBT or DRS transmission

## A.3.1.2 PCFICH/PDCCH/PHICH

### A.3.1.2.1 FDD

**Table A.3.1.2.1-1: PCFICH/PDCCH/PHICH Reference Channel for FDD**

| Parameter | Unit | Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference channel | | R.8 FDD | R.14 FDD | R.11 FDD | R.12 FDD | R.10 FDD | R.13 FDD | R.6 FDD | R.7 FDD | R.9 FDD |
| Channel bandwidth | MHz | 1.4 | 1.4 | 5 | 5 | 20 | 20 | 10 | 10 | 10 |
| Number of transmitter antennas | | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| Control region OFDM symbols[Note1] | symbols | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 |
| Aggregation level | CCE | 2 (Note 6) | 2 (Note 6) | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DCI Format | | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | Bits | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 |

Note 1: The control region consists of PCFICH, PHICH and PDCCH.
Note 2: DCI formats are defined in TS 36.212.
Note 3: DCI format shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.
Note 5: Payload size shall depend upon the test configuration.
Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.

### A.3.1.2.2 TDD

**Table A.3.1.2.2-1: PCFICH/PDCCH/PHICH Reference Channel for TDD**

| Parameter | Unit | Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference channel | | R.8 TDD | R.14 TDD | R.11 TDD | R.12 TDD | R.10 TDD | R.13 TDD | R.6 TDD | R.7 TDD | R.9 TDD |
| Channel bandwidth | MHz | 1.4 | 1.4 | 5 | 5 | 20 | 20 | 10 | 10 | 10 |
| Number of transmitter antennas | | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| Control region OFDM symbols[Note1] | symbols | 4 (Note 6) | 3 (Note 6) | 3 | 3 | 2 | 2 | 2 | 2 | 3 |
| Aggregation level | CCE | 2 (Note 7) | 2 (Note 7) | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| DCI Format | | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | Bits | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 | Note 5 |

Note 1: The control region consists of PCFICH, PHICH and PDCCH.
Note 2: DCI formats are defined in TS 36.212.
Note 3: DCI format shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.
Note 5: Payload size shall depend upon the test configuration.
Note 6: Only 2 OFDM symbols for special subframes 1 and 6.
Note 7: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.

#### A.3.1.2.3 HD-FDD for UE category 0

**Table A.3.1.2.3-1: PCFICH/PDCCH/PHICH Reference Channel for HD-FDD**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| Reference channel | | R.3 HD-FDD | R.4 HD-FDD | R.5 HD-FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 | 2 |
| Control region OFDM symbols[Note1] | symbols | 2 | 2 | 3 |
| Aggregation level | CCE | 8 | 8 | 8 |
| DCI Format | | Note 3 | Note 3 | Note 3 |
| Cell ID | | Note 4 | Note 4 | Note 4 |
| Payload (without CRC) | Bits | Note 5 | Note 5 | Note 5 |
| Note 1: The control region consists of PCFICH, PHICH and PDCCH.<br>Note 2: DCI formats are defined in TS 36.212.<br>Note 3: DCI format shall depend upon the test configuration.<br>Note 4: Cell ID shall depend upon the test configuration.<br>Note 5: Payload size shall depend upon the test configuration.<br>Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.<br>Note 7: Sub-frame 0 or sub-frame 5 is randomly scheduled in downlink. | | | | |

#### A.3.1.2.4 FS 3

**Table A.3.1.2.4-1: PCFICH/PDCCH/PHICH Reference Channel for FS 3**

| Parameter | Unit | Value | | | | |
|---|---|---|---|---|---|---|
| Reference channel | | | | | R.0 FS3 | |
| Channel bandwidth | MHz | 10 | 10 | 10 | 20 | |
| Number of transmitter antennas | | | | | 1 | |
| Control region OFDM symbols[Note1] | symbols | | | | 2 | |
| Aggregation level | CCE | | | | 8 | |
| DCI Format | | | | | Note 3 | |
| Cell ID | | | | | Note 4 | |
| Payload (without CRC) | Bits | | | | Note 5 | |
| Note 1: The control region consists of PCFICH, PHICH and PDCCH.<br>Note 2: DCI formats are defined in TS 36.212.<br>Note 3: DCI format shall depend upon the test configuration.<br>Note 4: Cell ID shall depend upon the test configuration.<br>Note 5: Payload size shall depend upon the test configuration.<br>Note 6: For PDCCH using SI/RA/P-RNTI, Aggregation level 4 is used.<br>Note 7: PCFICH/PDCCH/PHICH allocation applies only to subframes where there is no DRS transmission<br>Note 8: PCFICH/PDCCH/PHICH are not transmitted in subframes where it is determined that transmission should not occur according to the listen before talk (LBT model). | | | | | | |

### A.3.1.3 MPDCCH Reference Channels for Cat-M1 UEs

MPDCCH reference measurement channels in this section can be used in tests for Cat-M2 UEs.

#### A.3.1.3.1 FDD in CEModeA

**Table A.3.1.3.1-1: MPDCCH Reference Channel for Cat-M1 FDD UEs in CEModeA**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| MPDCCH Reference channel | - | R.16 FDD | R.17 FDD | R.24 FDD | R.25 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |

| | | | | | |
|---|---|---|---|---|---|
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 | 8 | 8 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 |
| Payload (without CRC) | Bits | Note 1 | Note 1 | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.3.2 HD-FDD in CEModeA

**Table A.3.1.3.2-1: MPDCCH Reference Channel for Cat-M1 HD-FDD UEs in CEModeA**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| MPDCCH Reference channel | - | R.6 HD-FDD | R.7 HD-FDD | R.14 HD-FDD | R.15 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 | 8 | 8 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th | 4th | 4th |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 |
| Payload (without CRC) | Bits | Note 1 | Note 1 | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.3.3 TDD in CEModeA

**Table A.3.1.3.3-1: MPDCCH Reference Channel for Cat-M1 TDD UEs in CEModeA**

| Parameter | Unit | Value | |
|---|---|---|---|
| MPDCCH Reference channel | - | R.14 TDD | R.15 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | - | 1 | 2 |
| DCI Format | - | 6-1A | 6-1A |
| Transmission Type | - | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 4 | 4 |
| Aggregation level | ECCE | 16 | 16 |
| Maximum number of repetitions | - | 8 | 8 |
| Frequency hopping | - | ON | ON |
| Number of narrowbands | - | 2 | 2 |
| MPDCCH Narrowband | - | 7th | 7th |
| Frequency HoppingOffset | narrowbands | 7 | 7 |

| | | | |
|---|---|---|---|
| MPDCCH start subframe | subframes | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 10 | 10 |
| Payload (without CRC) | Bits | Note 1 | Note 1 |
| Cell ID | - | Note 2 | Note 2 |
| Note 1: Payload size shall depend upon the test configuration.<br>Note 2: Cell ID shall depend upon the test configuration. | | | |

### A.3.1.3.4 FDD in CEModeB

**Table A.3.1.3.4-1: MPDCCH Reference Channel for Cat-M1 FDD UEs in CEModeB**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| MPDCCH Reference channel | - | R.18 FDD | R.19 FDD | R.26 FDD | R.27 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 | 128 | 128 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | $7^{th}$ | $7^{th}$ | $4^{th}$ | $4^{th}$ |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Payload (without CRC) | Bits | 18 | 18 | 17 | 17 |
| Cell ID | - | Note 1 | Note 1 | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.3.5 HD-FDD in CEModeB

**Table A.3.1.3.5-1: MPDCCH Reference Channel for Cat-M1 HD-FDD UEs in CEModeB**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| MPDCCH Reference channel | - | R.8 HD-FDD | R.9 HD-FDD | R.16 HD-FDD | R.17 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 | 128 | 128 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands | - | 2 | 2 | 2 | 2 |
| MPDCCH Narrowband | - | $7^{th}$ | $7^{th}$ | $4^{th}$ | $4^{th}$ |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| MPDCCH start subframe | subframes | 1 | 1 | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Payload (without CRC) | Bits | 18 | 18 | 17 | 17 |
| Cell ID | - | Note 1 | Note 1 | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.3.6 TDD in CEModeB

**Table A.3.1.3.6-1: MPDCCH Reference Channel for Cat-M1 TDD UEs in CEModeB**

| Parameter | Unit | Value | |
|---|---|---|---|
| MPDCCH Reference channel | - | R.16 TDD | R.17 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | - | 1 | 2 |
| DCI Format | - | 6-1B | 6-1B |
| Transmission Type | - | Distributed | Distributed |
| Number of PRB pairs per M-PDCCH set | - | 6 | 6 |
| Aggregation level | ECCE | 24 | 24 |
| Maximum number of repetitions | - | 128 | 128 |
| Frequency hopping | - | ON | ON |
| Number of narrowbands | - | 2 | 2 |
| MPDCCH Narrowband | - | $7^{th}$ | $7^{th}$ |
| Frequency HoppingOffset | narrowbands | 7 | 7 |
| MPDCCH start subframe | subframes | 1 | 1 |
| MPDCCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 20 | 20 |
| Payload (without CRC) | Bits | 18 | 18 |
| Cell ID | - | Note 1 | Note 1 |
| Note 1: Cell ID shall depend upon the test configuration. | | | |

## A.3.1.4 PDSCH Reference Channel for Cat-M1 UEs

### A.3.1.4.1 FDD in CEModeA

**Table A.3.1.4.1-1: PDSCH Reference Channel for Cat-M1 FDD in CEModeA**

| Parameter | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH Reference channel | | R.20 FDD | R.21 FDD | R.28 FDD | R.29 FDD | R.32 FDD | R.33 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 | 1 | 2 | 1 | 2 |
| Allocated resource blocks[Note1] | PRBs | 2 | 2 | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation | | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | | | |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame | | | | | | | |
| Sub-Frames 0 ~ 9 | | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum number of repetitions | | 16 | 16 | 16 | 16 | 1 | 1 |
| Frequency hopping | | ON | ON | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 | 2 | 2 |
| PDSCH Narrowband | | $2^{nd}$ | $2^{nd}$ | $2^{nd}$ | $2^{nd}$ | $2^{nd}$ | $2^{nd}$ |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 | 4 | 4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cell ID | | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | | | |

### A.3.1.4.2 HD-FDD in CEModeA

**Table A.3.1.4.2-1: PDSCH Reference Channel for Cat-M1 HD-FDD in CEModeA**

| Parameter | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH Reference channel | | R.10 HD-FDD | R.11 HD-FDD | R.18 HD-FDD | R.19 HD-FDD | R.24 HD-FDD | R.25 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 | 1 | 2 | 1 | 2 |
| Allocated resource blocks[Note1] | PRBs | 2 | 2 | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 | 10 | 10 |
| Modulation | | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | | | |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame | | | | | | | |
| Sub-Frames 0 ~ 9 | | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum number of repetitions | | 16 | 16 | 16 | 16 | 1 | 1 |
| Frequency hopping | | ON | ON | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 | 2 | 2 |
| PDSCH Narrowband | | 1st | 1st | 1st | 1st | 1st | 1st |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 4 | 4 | 4 | 4 | 4 | 4 |
| Cell ID | | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | | | |

### A.3.1.4.3 TDD in CEModeA

**Table A.3.1.4.3-1: PDSCH Reference Channel for Cat-M1 TDD in CEModeA**

| Parameter | Unit | Value | |
|---|---|---|---|
| PDSCH Reference channel | | R.16 TDD | R.17 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 |
| Allocated resource blocks[Note1] | PRBs | 2 | 2 |
| Allocated subframes per Radio Frame | | 4 | 4 |
| TDD Uplink-Downlink Configuration | | 0 | 0 |
| TDD Special Subframe Configuration | | 6 | 6 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| All Sub-Frames except 1, 6 (TDD) | Bits | 32 | 32 |
| All Sub-Frames except 1, 6 (TDD DwPTS) | - | 0 | 0 |
| Number of Code Blocks per Sub-Frame | | 1 | 1 |

| | | | |
|---|---|---|---|
| All Sub-Frames except 1, 6 (TDD) | | 1 | 1 |
| All Sub-Frames except 1, 6 (TDD DwPTS) | | 0 | 0 |
| Maximum number of repetitions | | 16 | 16 |
| Frequency hopping | | ON | ON |
| Number of narrowbands for frequency hopping | | 2 | 2 |
| PDSCH Narrowband | | 2nd | 2nd |
| Frequency HoppingOffset | narrowbands | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 10 | 10 |
| Cell ID | | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | |

### A.3.1.4.4 FDD in CEModeB

**Table A.3.1.4.4-1: PDSCH Reference Channel for Cat-M1 FDD in CEModeB**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| PDSCH Reference channel | | R.22 FDD | R.23 FDD | R.30 FDD | R.31 FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | | 1 | 2 | 1 | 2 |
| Allocated resource blocks[Note1] | | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | - | 10 | 10 | 10 | 10 |
| Modulation | - | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | - | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | |
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame | | | | | |
| Sub-Frames 0 ~ 9 | - | 1 | 1 | 1 | 1 |
| Maximum number of repetitions | - | 192 | 192 | 192 | 192 |
| Frequency hopping | - | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 |
| PDSCH Narrowband | - | 2nd | 2nd | 2nd | 2nd |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Cell ID | | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.4.5 HD-FDD in CEModeB

**Table A.3.1.4.5-1: PDSCH Reference Channel for Cat-M1 HD-FDD in CEModeB**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| PDSCH Reference channel | | R.12 HD-FDD | R.13 HD-FDD | R.20 HD-FDD | R.21 HD-FDD |
| Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Number of transmitter antennas | | 1 | 2 | 1 | 2 |
| Allocated resource blocks[Note1] | PRBs | 2 | 2 | 2 | 2 |
| Allocated subframes per Radio Frame | subframes | 10 | 10 | 10 | 10 |
| Modulation | | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Sub-Frames 0 ~ 9 | Bits | 32 | 32 | 32 | 32 |
| Number of Code Blocks per Sub-Frame | | | | | |
| Sub-Frames 0 ~ 9 | | 1 | 1 | 1 | 1 |
| Maximum number of repetitions | | 192 | 192 | 192 | 192 |
| Frequency hopping | | ON | ON | ON | ON |
| Number of narrowbands for frequency hopping | narrowbands | 2 | 2 | 2 | 2 |
| PDSCH Narrowband | | 1st | 1st | 1st | 1st |
| Frequency HoppingOffset | narrowbands | 7 | 7 | 3 | 3 |
| PDSCH start symbol | symbols | 2 | 2 | 2 | 2 |
| Frequency hopping interval | subframes | 8 | 8 | 8 | 8 |
| Cell ID | | Note 2 | Note 2 | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.4.6 TDD in CEModeB

**Table A.3.1.4.6-1: PDSCH Reference Channel for Cat-M1 TDD in CEModeB**

| Parameter | Unit | Value | |
|---|---|---|---|
| PDSCH Reference channel | | R.18 TDD | R.19 TDD |
| Carrier bandwidth | MHz | 10 | 10 |
| Number of transmitter antennas | | 1 | 2 |
| Allocated resource blocks[Note1] | PRBs | 2 | 2 |
| Allocated subframes per Radio Frame | | 4 | 4 |
| TDD Uplink-Downlink Configuration | | 0 | 0 |
| TDD Special Subframe Configuration | | 6 | 6 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| All Sub-Frames except 1, 6 (TDD) | Bits | 32 | 32 |
| All Sub-Frames except 1, 6 (TDD DwPTS) | - | 0 | 0 |
| Number of Code Blocks per Sub-Frame | | 1 | 1 |
| All Sub-Frames except 1, 6 (TDD) | | 1 | 1 |
| All Sub-Frames except 1, 6 (TDD DwPTS) | | 0 | 0 |
| Maximum number of repetitions | | 192 | 192 |
| Frequency hopping | | ON | ON |
| Number of narrowbands for frequency hopping | | 2 | 2 |
| PDSCH Narrowband | | 2nd | 2nd |
| Frequency HoppingOffset | narrowbands | 7 | 7 |
| PDSCH start symbol | symbols | 2 | 2 |
| Frequency hopping interval | subframes | 20 | 20 |
| Cell ID | | Note 2 | Note 2 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Cell ID shall depend upon the test configuration. | | | |

## A.3.1.5 NPDSCH Reference Channel for UE category NB1

### A.3.1.5.1 HD-FDD in-band operation

**Table A.3.1.5.1-1: NPDSCH Reference Channel for UE category NB1 for in-band operation**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDSCH Reference channel | - | R.14 HD-FDD | R.15 HD-FDD | R.16 HD-FDD | R.17 HD-FDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| Allocated resource blocks | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 40 Note 2 | 40 Note 2 | 40 Note 2 | 40 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 | 0 | 0 |
| Number of Code Blocks per Sub-Frame | | | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 1 Note 4 | 1 Note 4 | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 | | Note 5 | Note 5 | Note 5 | Note 5 |
| For Sub-Frame 0, 5 | | 0 | 0 | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 | Note 6 | Note 6 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Cell ID | - | Note 7 | Note 7 | Note 7 | Note 7 |
| Note 1: Shall depend upon the NPDSCH scheduling.<br>Note 2: Only apply for subframes scheduled with NPDSCH.<br>Note 3: 40 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.<br>Note 4: Only apply for subframes scheduled with NPDSCH.<br>Note 5: 1 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.<br>Note 6: Maximum number of repetitions shall depend upon the test configuration.<br>Note 7: Cell ID shall depend upon the test configuration. | | | | | |

## A.3.1.5.2 Void

## A.3.1.5.3 HD-FDD standalone operation

**Table A.3.1.5.3-1: NPDSCH Reference Channel for UE category NB1 for standalone operation**

| Parameter | Unit | Value | |
|---|---|---|---|
| NPDSCH Reference channel | - | R.18 HD-FDD | R.19 HD-FDD |
| Channel bandwidth | KHz | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 |
| Number of Code Blocks per Sub-Frame | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 | | Note 5 | Note 5 |
| For Sub-Frame 0, 5 | | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 |
| Cell ID | - | Note 7 | Note 7 |
| Note 1: Shall depend upon the NPDSCH scheduling<br>Note 2: Only apply for subframes scheduled with NPDSCH.<br>Note 3: 72 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.<br>Note 4: only apply for subframes scheduled with NPDSCH..<br>Note 5: 1 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.<br>Note 6: Maximum number of repetitions shall depend upon the test configuration.<br>Note 7: Cell ID shall depend upon the test configuration. | | | |

### A.3.1.5.4 Void

### A.3.1.5.5 HD-FDD guard band operation

**Table A.3.1.5.5-1: NPDSCH Reference Channel for UE category NB1 for guard band operation**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDSCH Reference channel | - | R.22 HD-FDD | R.23 HD-FDD | R.32 HD-FDD | R.33 HD-FDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 5 | 5 |
| Allocated resource blocks for NB-IoT | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 | 1/3 | 1/3 |
| Information Bit Payload | | | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | Bits | 72 Note 2 | 72 Note 2 | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 4, 9 | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| For Sub-Frame 0, 5 | Bits | 0 | 0 | 0 | 0 |
| Number of Code Blocks per Sub-Frame | | | | | |
| For Sub-Frame 1, 2, 3, 6, 7, 8 | | 1 Note 4 | 1 Note 4 | 1 Note 4 | 1 Note 4 |
| For Sub-Frame 4, 9 | | Note 5 | Note 5 | Note 5 | Note 5 |
| For Sub-Frame 0, 5 | | 0 | 0 | 0 | 0 |
| Maximum number of repetitions | - | Note 6 | Note 6 | Note 6 | Note 6 |
| Cell ID | - | Note 7 | Note 7 | Note 7 | Note 7 |

Note 1: Shall depend upon the NPDSCH scheduling.
Note 2: Only apply for subframes scheduled with NPDSCH.
Note 3: 72 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.
Note 4: Only apply for subframes scheduled with NPDSCH.
Note 5: 1 for subframes scheduled with NPDSCH when $n_f \bmod 2 \neq 0$. Otherwise 0.
Note 6: Maximum number of repetitions shall depend upon the test configuration.
Note 7: Cell ID shall depend upon the test configuration.

### A.3.1.5.6 Void

### A.3.1.5.7 TDD in-band operation

**Table A.3.1.5.7-1: NPDSCH Reference Channel for UE category NB1 for in-band operation**

| Parameter | Unit | Value | |
|---|---|---|---|
| NPDSCH Reference channel | - | R.14 NB-TDD | R.15 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 |
| Allocated resource blocks | PRB | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| For Sub-Frame 4 | Bits | 40 Note 2 | 40 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 16 or 40 Note 6 | 16 or 40 Note 6 |
| Number of Code Blocks per Sub-Frame | | | |
| For Sub-Frame 4 | | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 | | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| NPDCCH start symbol | symbols | 3 | 3 |
| Cell ID | - | Note 4 | Note 4 |

Note 1: Shall depend upon the NPDSCH scheduling.
Note 2: Only apply for subframes scheduled with NPDSCH.
Note 3: Maximum number of repetitions shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.
Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.
Note 6: Set 40 when NPDSCH is transmitted with repetition. Set 16 when NPDSCH is transmitted without repetition.

### A.3.1.5.8 TDD standalone operation

**Table A.3.1.5.8-1: NPDSCH Reference Channel for UE category NB1 for standalone operation**

| Parameter | Unit | Value | |
|---|---|---|---|
| NPDSCH Reference channel | - | R.18 NB-TDD | R.19 NB-TDD |
| Channel bandwidth | KHz | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| For Sub-Frame 4 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 40 or 72 Note 6 | 40 or 72 Note 6 |
| Number of Code Blocks per Sub-Frame | | | |
| For Sub-Frame 4 | | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 | | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 |

Note 1: Shall depend upon the NPDSCH scheduling.
Note 2: Only apply for subframes scheduled with NPDSCH.
Note 3: Maximum number of repetitions shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.
Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.
Note 6: Set 72 when NPDSCH is transmitted with repetition. Set 40 when NPDSCH is transmitted without repetition.

### A.3.1.5.9 TDD guard band operation

**Table A.3.1.5.9-1: NPDSCH Reference Channel for UE category NB1 for guard band operation**

| Parameter | Unit | Value | |
|---|---|---|---|
| NPDSCH Reference channel | - | R.22 NB-TDD | R.23 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 |
| Allocated resource blocks for NB-IoT | PRB | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 |
| Allocated subframes per Radio Frame | subframes | Note 1 | Note 1 |
| Modulation | | QPSK | QPSK |
| Target coding rate | | 1/3 | 1/3 |
| Information Bit Payload | | | |
| For Sub-Frame 4 | Bits | 72 Note 2 | 72 Note 2 |
| For Sub-Frame 0, 5, 9 | Bits | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | Bits | 40 or 72 Note 6 | 40 or 72 Note 6 |
| Number of Code Blocks per Sub-Frame | | | |
| For Sub-Frame 4 | | 1 Note 2 | 1 Note 2 |
| For Sub-Frame 0, 5, 9 | | 0 | 0 |
| For Sub-Frame 1, 6 (DwPTS) | | 1 | 1 |
| Maximum number of repetitions | - | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 |
| Note 1: Shall depend upon the NPDSCH scheduling. | | | |

Note 2: Only apply for subframes scheduled with NPDSCH.
Note 3: Maximum number of repetitions shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.
Note 5: SIB1-NB is transmitted in subframe 0 in odd radio frames.
Note 6: Set 72 when NPDSCH is transmitted with repetition. Set 40 when NPDSCH is transmitted without repetition.

## A.3.1.6 NPDCCH Reference Channel for UE category NB1

### A.3.1.6.1 In-band operation

**Table A.3.1.6.1-1: NPDCCH Reference Channel for UE category NB1 for in-band operation in 10MHz LTE system**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDCCH Reference channel | - | R.26 HD-FDD R.26 NB-TDD | R.27 HD-FDD R.27 NB-TDD | R.28 HD-FDD R.28 NB-TDD | R.29 HD-FDD R.29 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 10 | 10 |
| Allocated resource blocks Note1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |

Note 1: Allocation is located in the middle of narrowband.
Note 2: Maximum number of repetitions shall depend upon the test configuration.
Note 3: Payload size shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.

**Table A.3.1.6.1-2: NPDCCH Reference Channel for UE category NB1 for in-band operation in 5MHz LTE system**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDCCH Reference channel | - | R.38 HD-FDD | R.39 HD-FDD | R.40 HD-FDD | R.41 HD-FDD |
| LTE Carrier bandwidth | MHz | 5 | 5 | 5 | 5 |
| Allocated resource blocks Note1 | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| NPDCCH start symbol | symbols | 3 | 3 | 3 | 3 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |

Note 1: Allocation is located in the middle of narrowband.
Note 2: Maximum number of repetitions shall depend upon the test configuration.
Note 3: Payload size shall depend upon the test configuration.
Note 4: Cell ID shall depend upon the test configuration.

### A.3.1.6.2 Void

### A.3.1.6.3 Standalone operation

**Table A.3.1.6.3-1: NPDCCH Reference Channel for UE category NB1 for standalone operation**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDCCH Reference channel | - | R.30 HD-FDD<br>R.30 NB-TDD | R.31 HD-FDD<br>R.31 NB-TDD | R.32 HD-FDD<br>R.32 NB-TDD | R.33 HD-FDD<br>R.33 NB-TDD |
| Channel bandwidth | KHz | 200 | 200 | 200 | 200 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Maximum number of repetitions shall depend upon the test configuration.<br>Note 3: Payload size shall depend upon the test configuration.<br>Note 4: Cell ID shall depend upon the test configuration. | | | | | |

### A.3.1.6.4 Void

### A.3.1.6.5 Guard band operation

**Table A.3.1.6.5-1: NPDCCH Reference Channel for UE category NB1 for guard band operation in 10MHz LTE system**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDCCH Reference channel | - | R.34 HD-FDD<br>R.34 NB-TDD | R.35 HD-FDD<br>R.35 NB-TDD | R.36 HD-FDD<br>R.36 NB-TDD | R.37 HD-FDD<br>R.37 NB-TDD |
| LTE Carrier bandwidth | MHz | 10 | 10 | 10 | 10 |
| Allocated resource blocks for NB-ioT[Note1] | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Maximum number of repetitions shall depend upon the test configuration.<br>Note 3: Payload size shall depend upon the test configuration.<br>Note 4: Cell ID shall depend upon the test configuration. | | | | | |

**Table A.3.1.6.5-2: NPDCCH Reference Channel for UE category NB1 for guard band operation in 5MHz LTE system**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| NPDCCH Reference channel | - | R.42 HD-FDD | R.43 HD-FDD | R.44 HD-FDD | R.45 HD-FDD |
| LTE Carrier bandwidth | MHz | 5 | 5 | 5 | 5 |
| Allocated resource blocks for NB-ioT[Note1] | PRB | 1 | 1 | 1 | 1 |
| Number of transmitter antennas | - | 1 | 2 | 1 | 2 |
| DCI Format | - | N1 | N1 | N0 | N0 |
| Aggregation level | NCCE | 2 | 2 | 2 | 2 |
| Maximum number of repetitions | - | Note 2 | Note 2 | Note 2 | Note 2 |
| Payload (without CRC) | Bits | Note 3 | Note 3 | Note 3 | Note 3 |

| | | | | | |
|---|---|---|---|---|---|
| Cell ID | - | Note 4 | Note 4 | Note 4 | Note 4 |
| Note 1: Allocation is located in the middle of narrowband.<br>Note 2: Maximum number of repetitions shall depend upon the test configuration.<br>Note 3: Payload size shall depend upon the test configuration.<br>Note 4: Cell ID shall depend upon the test configuration. | | | | | |

#### A.3.1.6.6 Void

## A.3.2 OFDMA Channel Noise Generator (OCNG)

### A.3.2.1 OCNG Patterns for FDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test) and/or allocations used for MBSFN. The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level ( $\gamma$ ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB,$$

where $\gamma_i$ denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels $\gamma$ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a constant transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. The number of PDCCH OFDM symbols in the non-MBSFN subframes is the same as specified in the RMC used in the test. The number of PDCCH OFDM symbols in the MBSFN subframe is the maximal allowed according to TS 36.213 [16]. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For subframes configured as PRS subframes the PDSCH allocation defined in the OCNG pattern does not apply.

For subframes configured as ABS subframes the PDSCH and PMCH allocation defined in the OCNG pattern does not apply.

The system information is scheduled in the allocations reserved for the OCNG patterns, in the subframes not configured for MBSFN. For this purpose the number of the RB-s allocated with PDSCH defined in the OCNG pattern can be reduced as necessary.

#### A.3.2.1.1 OCNG FDD pattern 1: outer resource blocks allocation in 10 MHz

**Table A.3.2.1.1-1: OP.1 FDD: OCNG FDD Pattern 1**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** | **PMCH Data** |
|---|---|---|---|---|---|---|
| | **Subframe** | | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | | |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 37 – 49 | 0 | 0 | 0 | N/A | | |
| 0-49 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be | | | | | | |

uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

Note 5: If SPDCCH is to be transmitted on a physical resource block(PRB), this takes priority over OCNG transmission

N/A: Not Applicable

### A.3.2.1.2 OCNG FDD pattern 2: full bandwidth allocation in 10 MHz

**Table A.3.2.1.2-1: OP.2 FDD: OCNG FDD Pattern 2**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data | PMCH Data |
|---|---|---|---|---|---|---|
| | Subframe | | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | | |
| 0 – 49 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 49 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

### A.3.2.1.3 OCNG FDD pattern 3: outer resource blocks allocation in 1.4 MHz

**Table A.3.2.1.3-1: OP.3 FDD: OCNG FDD Pattern 3**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data | PMCH Data |
|---|---|---|---|---|---|---|
| | Subframe | | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | | |
| 0 – 1 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 4 – 5 | 0 | 0 | 0 | N/A | | |
| 0 – 5 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

### A.3.2.1.4 OCNG FDD pattern 4: full bandwidth allocation in 1.4 MHz

**Table A.3.2.1.4-1: OP.4 FDD: OCNG FDD Pattern 4**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** | **PMCH Data** |
|---|---|---|---|---|---|---|
| | **Subframe** | | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | | |
| 0 – 5 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 5 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

### A.3.2.1.5 OCNG FDD pattern 5: outer resource blocks allocation in 10 MHz (without MBSFN)

**Table A.3.2.1.5-1: OP.5 FDD: OCNG FDD Pattern 5**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe (Note 1)** | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 2 |
| 37 – 49 | 0 | 0 | 0 | N/A | |
| 0 – 49 | N/A | N/A | N/A | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

| | |
|---|---|
| Note 3: | If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. |
| N/A: | Not Applicable |

### A.3.2.1.6 OCNG FDD pattern 6: full bandwidth allocation in 10 MHz (without MBSFN)

**Table A.3.2.1.6-1: OP.6 FDD: OCNG FDD Pattern 6**

| **Allocation** $n_{PRB}$ | **Relative power level $\gamma_{PRB}$ [dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe (Note 1)** | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

N/A: Not Applicable

### A.3.2.1.7 OCNG FDD pattern 7: full bandwidth allocation in 1.4 MHz (without MBSFN)

**Table A.3.2.1.7-1: OP.7 FDD: OCNG FDD Pattern 7**

| **Allocation** $n_{PRB}$ | **Relative power level $\gamma_{PRB}$ [dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe (Note 1)** | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |
| 0 – 5 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

N/A: Not Applicable

### A.3.2.1.8 OCNG FDD pattern 8: outer resource blocks allocation in 10 MHz for MBSFN ABS

**Table A.3.2.1.8-1: OP.8 FDD: OCNG FDD Pattern 8**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4,9 | (1-3, 6-8)[Note4] | |
| 0 – 12 | 0 | 0 | 0 | N/A | Note 2 |
| 37 – 49 | 0 | 0 | 0 | N/A | |
| 0 – 49 | N/A | N/A | N/A | 0 | |

Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 4: The subframe(s) configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.
N/A: Not Applicable

### A.3.2.1.9 OCNG FDD pattern 9: full bandwidth allocation in 10 MHz for MBSFN ABS

**Table A.3.2.1.9-1: OP.9 FDD: OCNG FDD Pattern 9**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4, 9 | (1-3, 6-8)[Note4] | |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: PDSCH allocation applies only to subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 4: The subframe(s) configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.
N/A: Not Applicable

### A.3.2.1.10 OCNG FDD pattern 10: outer resource blocks allocation in 10 MHz with user data in every subframe (without MBSFN)

**Table A.3.2.1.10-1: OP.10 FDD: OCNG FDD Pattern 10**

| Allocation | Relative power level $\gamma_{PRB}$ [dB] | PDSCH Data |
|---|---|---|

| $n_{PRB}$ | Subframe (Note 1) | | | | |
|---|---|---|---|---|---|
| | 0 | 5 | 4, 9 | 1 - 3, 6 - 8 | |
| 0 - 12 | 0 | 0 | 0 | 0 | Note 2 |
| 37 - 49 | 0 | 0 | 0 | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
N/A: Not Applicable

### A.3.2.1.11 OCNG FDD pattern 11: outer resource blocks allocation in 20 MHz

**Table A.3.2.1.11-1: OP.11 FDD: OCNG FDD Pattern 11**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data | PMCH Data |
|---|---|---|---|---|---|---|
| | Subframe | | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | | |
| 0 – 37 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 62 – 99 | 0 | 0 | 0 | N/A | | |
| 0-99 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS
N/A: Not Applicable

### A.3.2.1.12 OCNG FDD pattern 12: full bandwidth allocation in 20 MHz

**Table A.3.2.1.12-1: OP.12 FDD: OCNG FDD Pattern 12**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data | PMCH Data |
|---|---|---|---|---|---|---|
| | Subframe | | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | | |
| 0 – 99 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 99 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

### A.3.2.1.13 OCNG FDD pattern 13: outer resource blocks allocation in 20 MHz (without MBSFN)

**Table A.3.2.1.13-1: OP.13 FDD: OCNG FDD Pattern 13**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | |
| 0 – 37 | 0 | 0 | 0 | N/A | Note 2 |
| 62 – 99 | 0 | 0 | 0 | N/A | |
| 0 – 99 | N/A | N/A | N/A | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

N/A: Not Applicable

### A.3.2.1.14 OCNG FDD pattern 14: full bandwidth allocation in 20 MHz (without MBSFN)

**Table A.3.2.1.14-1: OP.14 FDD: OCNG FDD Pattern 14**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |
| 0 – 99 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit

| | |
|---|---|
| | power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. |
| N/A: | Not Applicable |

## A.3.2.1.15 OCNG FDD pattern 15: outer resource blocks allocation in 5 MHz

**Table A.3.2.1.15-1: OP.15 FDD: OCNG FDD Pattern 15**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** | **PMCH Data** |
|---|---|---|---|---|---|---|
| | **Subframe** | | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | | |
| 0 – 6 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 18 – 24 | 0 | 0 | 0 | N/A | | |
| 0-24 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

## A.3.2.1.16 OCNG FDD pattern 16: full bandwidth allocation in 5 MHz

**Table A.3.2.1.16-1: OP.16 FDD: OCNG FDD Pattern 16**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** | **PMCH Data** |
|---|---|---|---|---|---|---|
| | **Subframe** | | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | | |
| 0 – 24 | 0 | 0 | 0 | N/A | Note 1 | N/A |
| 0 – 24 | N/A | N/A | N/A | Note 4 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 2: Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter $\gamma_{PRB}$ is used to scale the power of PMCH.

Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

Note 4: 0dB for 1 transmit antenna with CRS, +3dB for 2 transmit antennas with CRS

N/A: Not Applicable

### A.3.2.1.17 OCNG FDD pattern 17: outer resource blocks allocation in 20 MHz with user data in every subframe (without MBSFN)

**Table A.3.2.1.17-1: OP.17 FDD: OCNG FDD Pattern 17**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4, 9 | 1 - 3, 6 - 8 | |
| 0 - 37 | 0 | 0 | 0 | 0 | Note 2 |
| 62 - 99 | 0 | 0 | 0 | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
N/A: Not Applicable.

### A.3.2.1.18 OCNG FDD pattern 18: outer resource blocks allocation in 5 MHz (without MBSFN)

**Table A.3.2.1.18-1: OP.18 FDD: OCNG FDD Pattern 18**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4,9 | 1-3, 6-8 | |
| 0 – 6 | 0 | 0 | 0 | N/A | Note 2 |
| 18 – 24 | 0 | 0 | 0 | N/A | |
| 0 – 24 | N/A | N/A | N/A | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
N/A: Not Applicable

### A.3.2.1.19 OCNG FDD pattern 19: full bandwidth allocation in 5 MHz (without MBSFN)

**Table A.3.2.1.19-1: OP.19 FDD: OCNG FDD Pattern 19**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |

| | | | | | |
|---|---|---|---|---|---|
| 0 – 24 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
N/A: Not Applicable

### A.3.2.1.20 OCNG FDD pattern 20: outer resource blocks allocation in 5 MHz with user data in every subframe (without MBSFN)

**Table A.3.2.1.20-1: OP.20 FDD: OCNG FDD Pattern 20**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe (Note 1)** | | | | |
| | 0 | 5 | 4, 9 | 1 - 3, 6 - 8 | |
| 0 - 6 | 0 | 0 | 0 | 0 | Note 2 |
| 18 - 24 | 0 | 0 | 0 | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.
N/A: Not Applicable.

### A.3.2.1.21 OCNG FDD pattern 21: Generic resource blocks allocation (without MBSFN)

**Table A.3.2.1.21-1: OP.21 FDD: OCNG FDD Pattern 21**

| **OCNG Pattern Name** | **Bandwidth (MHz)** | **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|---|---|
| | | | **Subframe** Note 5 | | | | |
| | | | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |
| OP.21 FDD | 10 | 0 – 49 Note 1,2 | 0 | 0 | 0 | 0 | Note 3 |

Note 1: The OCNG pattern is used only for a serving cell of the UE under test.
Note 2: The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test.
Note 3: OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 4: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit

| | |
|---|---|
| | power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. |
| Note 5: | The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes. |

### A.3.2.1.22 OCNG FDD pattern 22: Generic resource blocks allocation in 5MHz (without MBSFN)

**Table A.3.2.1.22-1: OP.22 FDD: OCNG FDD Pattern 22**

| OCNG Pattern Name | Bandwidth (MHz) | Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|---|---|
| | | | Subframe | | | | |
| | | | 0 | 5 | 4, 9 | 1 – 3, 6 – 8 | |
| OP.22 FDD | 5 | 0 – 24 Note 1,2 | 0 | 0 | 0 | 0 | Note 3 |

Note 1: The OCNG pattern is used only for a serving cell of the UE under test.
Note 2: The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test.
Note 3: OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 4: If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

## A.3.2.2 OCNG Patterns for TDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level ( $\gamma$ ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB,$$

where $\gamma_i$ denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels $\gamma$ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. The number of PDCCH OFDM symbols in the non-MBSFN subframes is the same as specified in the RMC used in the test. The number of PDCCH OFDM symbols in the MBSFN subframe is the maximal allowed according to TS 36.213 [16]. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For subframes configured as PRS subframes the PDSCH allocation defined in the OCNG pattern does not apply.

For subframes configured as ABS subframes the PDSCH and PMCH allocation defined in the OCNG pattern does not apply.

The system information is scheduled in the allocations reserved for the OCNG patterns, in the subframes not configured for MBSFN. For this purpose the number of the RB-s allocated with PDSCH defined in the OCNG pattern can be reduced as necessary.

### A.3.2.2.1 OCNG TDD pattern 1: outer resource blocks allocation in 10 MHz

**Table A.3.2.2.1-1: OP.1 TDD: OCNG TDD Pattern 1 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 12 | 0 | 0 | 0 | Table A.3.2.2.1-2 | Note 2 |
| 37 – 49 | 0 | 0 | 0 | | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16].
Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 5: If SPDCCH is to be transmitted on a physical resource block(PRB), this takes priority over OCNG transmission

**Table A.3.2.2.1-2: OP.1 TDD: OCNG TDD Pattern 1 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Special subframe configuration | | | | | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| | Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 12 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| 37 – 49 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |

Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16].

### A.3.2.2.2 OCNG TDD pattern 2: full bandwidth allocation in 10 MHz

**Table A.3.2.2.2-1: OP.2 TDD: OCNG TDD Pattern 2 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].

Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

### A.3.2.2.3 OCNG TDD pattern 3: outer resource blocks allocation in 1.4 MHz

**Table A.3.2.2.3-1: OP.3 TDD: OCNG TDD Pattern 3 for 5 ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 1 | 0 | 0 | 0 | 0 | Note 2 |
| 4 – 5 | 0 | 0 | 0 | 0 | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16].

Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

### A.3.2.2.4 OCNG TDD pattern 4: full bandwidth allocation in 1.4 MHz

**Table A.3.2.2.4-1: OP.4 TDD: OCNG TDD Pattern 4 for 5 ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 5 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].

Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

### A.3.2.2.5 OCNG TDD pattern 5: outer resource blocks allocation in 10 MHz for MBSFN ABS

**Table A.3.2.2.5-1: OP.5 TDD: OCNG TDD Pattern 5 for 5ms downlink-to-uplink switch-point periodicity**

| **Allocation** $n_{PRB}$ | **Relative power level $\gamma_{PRB}$ [dB]** | | | | **PDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe (Note 1)** | | | | |
| | 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 12 | 0 | 0 | 0 | Table A.3.2.2.5-2 | Note 2 |
| 37 – 49 | 0 | 0 | 0 | | |

Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in TS 36.211 [16]. Any of the subframes 3, 4, 8 and 9 configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.

Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

**Table A.3.2.2.5-2: OP.5 TDD: OCNG TDD Pattern 5 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Special subframe configuration | | | | | | | | | | | | | | | | | |
| | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| | Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 12 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| 37 – 49 | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | |

## A.3.2.2.6 OCNG TDD pattern 6: full bandwidth allocation in 10 MHz for MBSFN ABS

**Table A.3.2.2.6-1: OP.6 TDD: OCNG TDD Pattern 6 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 49 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: PDSCH allocation does not apply to subframes configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16]. Any of the subframes 3, 4, 8 and 9 configured as MBSFN ABS in a test shall not contain any PMCH data and shall contain CRS only in the first symbol of the first time slot. The subframe(s) configured as MBSFN ABS depend upon the MBSFN ABS pattern used in the test.
Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

## A.3.2.2.7 OCNG TDD pattern 7: outer resource blocks allocation in 20 MHz

**Table A.3.2.2.7-1: OP.7 TDD: OCNG TDD Pattern 7 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 37 | 0 | 0 | 0 | Table A.3.2.2.7-2 | Note 2 |
| 62 – 99 | 0 | 0 | 0 | | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in 3GPP TS 36.211 [16].
Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the

transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

**Table A.3.2.2.7-2: OP.7 TDD: OCNG TDD Pattern 7 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | CP length | Relative power level $\gamma_{PRB}$ [dB] | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Special subframe configuration | | | | | | | | | | | | | | | |
| | | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| | | Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| | | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 37 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| 62 – 99 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |

Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16].

## A.3.2.2.8 OCNG TDD pattern 8: full bandwidth allocation in 20 MHz

**Table A.3.2.2.8-1: OP.8 TDD: OCNG TDD Pattern 8 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 99 | 0 | 0 | 0 | 0 | Note 2 |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211 [16].

Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.

## A.3.2.2.9 OCNG TDD pattern 9: outer resource blocks allocation in 5 MHz

**Table A.3.2.2.9-1: OP.9 TDD: OCNG TDD Pattern 9 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3, 4, 8, 9 and 6 (as normal subframe) Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 6 | 0 | 0 | 0 | Table A.3.2.2.9-2 | Note 2 |
| 18 – 24 | 0 | 0 | 0 | | |

Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.

Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration defined in Table 4.2-2 in 3GPP TS 36.211 [16].

| | |
|---|---|
| Note 4: | If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. |

**Table A.3.2.2.9-2: OP.9 TDD: OCNG TDD Pattern 9 for special subframe configuration with 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | CP length | Relative power level $\gamma_{PRB}$ [dB] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Special subframe configuration | | | | | | | | | | | | | | | | | |
| | | 0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| | | Control region OFDM symbols | | | | | | | | | | | | | | | | | |
| | | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 0 – 6 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | | | | | | | | | | | | | | |
| 18 – 24 | N | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| | | | | | | | | | | | | | | | | | | | |
| Note 1: Special subframe configurations are defined in Table 4.2-1 in TS 36.211 [16]. | | | | | | | | | | | | | | | | | | | |

## A.3.2.2.10 OCNG TDD pattern 10: full bandwidth allocation in 5 MHz

**Table A.3.2.2.10-1: OP.10 TDD: OCNG TDD Pattern 10 for 5ms downlink-to-uplink switch-point periodicity**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|
| | Subframe (Note 1) | | | | |
| | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe)Note 3 | 1 and 6 (as special subframe) Note 3 | |
| 0 – 24 | 0 | 0 | 0 | 0 | Note 2 |
| Note 1: The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes. | | | | | |
| Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH. | | | | | |
| Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211 [16]. | | | | | |
| Note 4: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213. | | | | | |

## A.3.2.2.11 OCNG TDD pattern 11: Generic resource blocks allocation (without MBSFN)

**Table A.3.2.2.11-1: OP.11 TDD: OCNG TDD Pattern 11**

| OCNG Pattern Name | Bandwidth (MHz) | Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | | PDSCH Data |
|---|---|---|---|---|---|---|---|
| | | | Subframe Note 6 | | | | |
| | | | 0 | 5 | 3 , 4, 8, 9 and 6 (as normal subframe) Note 5 | 1 and 6 (as special subframe) Note 5 | |
| OP.11 TDD | 10 | 0 – 49Note 1,2 | 0 | 0 | 0 | 0 | Note 3 |
| Note 1: The OCNG pattern is used only for a serving cell of the UE under test. | | | | | | | |

| | |
|---|---|
| Note 2: | The OCNG allocation applied to all downlink physical resource bloacks (PRBs) except the REs that are allocated for the PDSCH for the UE under test. |
| Note 3: | OCNG PRBs are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH. |
| Note 4: | If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. |
| Note 5: | Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16]. |
| Note 6: | The allocation of any PDSCH with or without SIB1 applies only to the subframes not configured as PRS subframes. |

### A.3.2.3 OCNG Patterns for Narrowband IoT

The following Narrowband OCNG patterns (NOCNG) are used for modelling allocations to UEs not under test in a Narrowband IoT cell. Depending on scenario, allocations may be for UEs of category NB1only, or for UEs of category NB1 as well as of other categories. The former is applicable to guard-band and stand-alone deployments of Narrowband IoT, whereas the latter is applicable to in-band deployment. In order to allow different power levels for the LTE cell and the Narrowband IoT cell, a distinction is made between OCNG and NOCNG where the latter is used for category NB1 UEs and the former is used for other UE categories.

OCNG in the LTE cell is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level ($\gamma$) specifies the PDSCH-to-RS EPRE ratio in OFDM symbols with and without LTE cell-specific reference symbols, respectively. The relative power, which is used for modelling boosting per virtual LTE UE allocation, is expressed by:

$$\gamma_i = PDSCH_i_RA / OCNG_RA = PDSCH_i_RB / OCNG_RB$$

where $\gamma_i$ denotes the relative power level of the *i:th* virtual LTE UE.

Moreover in each test case NOCNG is expressed by parameters NOCNG_RA and NOCNG_RB which together with a relative power level ($\gamma$) specifies the <channel>-to-RS EPRE ratio in OFDM symbols with and without Narrowband reference symbols (NB-RS), respectively. The relative power, which is used for modelling boosting per virtual UE category NB1 allocation, is expressed by:

$$\gamma_k = <channel_k>_RA / NOCNG_RA = <channel_k>_RB / NOCNG_RB$$

where $\gamma_k$ denotes the relative power level of the *k:th* virtual NB-IoT UE, and channel may be either of NPDCCH and NPDSCH.

The parameter settings of OCNG_RA, OCNG_RB, NOCNG_RA, NOCNG_RB and the set of relative power levels $\gamma$ are chosen such that when also taking allocations to the UE category NB1 under test into account, as given by a NPDCCH and NPDSCH reference channels, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

### A.3.2.3.1 Narrowband IoT OCNG FDD pattern 1: In-band NB-IoT in 10 MHz EUTRAN cell

**Table A.3.2.3.1-1: NOP.1 FDD: OCNG FDD Pattern 1**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | **PDSCH Data** | **NPDCCH and NPDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe** | | | | |
| | 0, 4 | 5, 9 | 1-3, 6-8 | | |
| *0* – ( *nCell[1]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) – ( *nCell[N]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 49 (Note 5) | 0 | 0 | 0 | Note 1 | N/A |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 3: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.

Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.

Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same LTE donor cell as specified in the individual tests.

N/A: Not Applicable

### A.3.2.3.2 Narrowband IoT OCNG FDD pattern 2: guard band NB-IoT in 10 MHz EUTRAN cell

**Table A.3.2.3.2-1: NOP.2 FDD: OCNG FDD Pattern 2**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | PDSCH Data | NPDCCH and NPDSCH Data |
|---|---|---|---|---|---|
| | Subframe | | | | |
| | 0, 4 | 5, 9 | 1-3, 6-8 | | |
| 0-49 | 0 | 0 | 0 | Note 1 | N/A |
| 50 | 0 (Note 3) | 0 (Note 3) | 0 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 3: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell ($n_{PRB}$ = 50).

Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.

N/A: Not Applicable

### A.3.2.3.3 Narrowband IoT OCNG FDD pattern 3: standalone NB-IoT

**Table A.3.2.3.3-1: NOP.3 FDD: OCNG FDD Pattern 3**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | NPDCCH and NPDSCH Data |
|---|---|---|---|---|
| | Subframe | | | |
| | 0, 4 | 5, 9 | 1-3, 6-8 | |
| 0 | 0 (Note 2) | 0 (Note 2) | 0 | Note 1 |

Note 1: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 2: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell ($n_{PRB}$ = 0).

Note 3: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over NOCNG.

### A.3.2.3.4 Narrowband IoT OCNG FDD pattern 4: In-band NB-IoT in 5 MHz EUTRAN cell

**Table A.3.2.3.4-1: NOP.4 FDD: OCNG FDD Pattern 4**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | **PDSCH Data** | **NPDCCH and NPDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe** | | | | |
| | 0, 4 | 5, 9 | 1-3, 6-8 | | |
| *0* – ( *nCell[1]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) – ( *nCell[N]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB* (Note 5) | 0 (Note 3) | 0 (Note 3) | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 24 (Note 5) | 0 | 0 | 0 | Note 1 | N/A |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 3: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.

Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.

Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same LTE donor cell as specified in the individual tests.

N/A: Not Applicable

### A.3.2.3.5 Narrowband IoT OCNG FDD pattern 5: guard band NB-IoT in 5 MHz EUTRAN cell

**Table A.3.2.3.5-1: NOP.5 FDD: OCNG FDD Pattern 5**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | PDSCH Data | NPDCCH and NPDSCH Data |
|---|---|---|---|---|---|
| | Subframe | | | | |
| | 0, 4 | 5, 9 | 1-3, 6-8 | | |
| 0 – 24 | 0 | 0 | 0 | Note 1 | N/A |
| 25 | 0 (Note 3) | 0 (Note 3) | 0 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.

Note 3: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell ($n_{PRB}$ = 25).

Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.

N/A: Not Applicable

### A.3.2.3.6 Narrowband IoT OCNG TDD pattern 1: In-band NB-IoT in 10 MHz EUTRAN cell

**Table A.3.2.3.6-1: NOP.1 TDD: OCNG TDD Pattern 1 for uplink-downlink configurations 1 and 2**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | | | PDSCH Data | NPDCCH and NPDSCH Data |
|---|---|---|---|---|---|
| | Subframe | | | | |
| | 0, 5, 9 | 1, 6[Note 7] | 3, 4, 8[Note 4] | | |
| *0* – ( *nCell[1]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[1]RB* (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[1]RB +1* ) – ( *nCell[…]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[…]RB* (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[...]RB +1* ) – ( *nCell[N]RB -1*) (Note 5) | 0 | 0 | 0 | Note 1 | N/A |
| *nCell[N]RB* (Note 5) | 0 (Note 3) | 0 | N/A | N/A | Note 2 |
| | N/A | N/A | 0 | Note 1 | N/A |
| *( nCell[N]RB+1* ) – 49 (Note 5) | 0 | 0 | 0 | Note 1 | N/A |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 3: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS, and NPBCH in anchor cells.
Note 4: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].
Note 5: *nCell[k]RB* is the index of the RB used for allocation of the NB-IoT cell *k* with *k = {1, .., N}* with *N* the total number of the NB-IoT cells belonging to the same E-UTRA donor cell as specified in the individual tests.
Note 6: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG.
Note 7: Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use.

N/A: Not Applicable

## A.3.2.3.7 Narrowband IoT OCNG TDD pattern 2: guard band NB-IoT in 10 MHz EUTRAN cell

**Table A.3.2.3.7-1: NOP.2 TDD: OCNG TDD Pattern 2 for uplink-downlink configurations 1 and 2**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | **PDSCH Data** | **NPDCCH and NPDSCH Data** |
|---|---|---|---|---|---|
| | **Subframe** | | | | |
| | 0, 5, 9 | 1, 6[Note 6] | 3, 4, 8[Note 4] | | |
| 0-49 | 0 | 0 | 0 | Note 1 | N/A |
| 50 | 0 (Note 3) | 0 | 0 | N/A | Note 2 |

Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of PDSCH.
If two or more transmit antennas with CRS are used in the test, the PDSCH part of OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the PDSCH part of OCNG is equal between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 2: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is

| | |
|---|---|
| | equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213. |
| Note 3: | Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell ( $n_{PRB}$ = 50). |
| Note 4: | Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16]. |
| Note 5: | SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over OCNG and NOCNG. |
| Note 6: | Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use. |
| N/A: | Not Applicable |

### A.3.2.3.8 Narrowband IoT OCNG TDD pattern 3: standalone NB-IoT

**Table A.3.2.3.8-1: NOP.3 TDD: OCNG TDD Pattern 3 for uplink-downlink configurations 1 and 2**

| **Allocation** $n_{PRB}$ | **Relative power level** $\gamma_{PRB}$ **[dB]** | | | **NPDCCH and NPDSCH Data** |
|---|---|---|---|---|
| | **Subframe** | | | |
| | 0, 5, 9 | 1, 6[Note 5] | 3, 4, 8[Note 3] | |
| 0 | 0 (Note 2) | 0 | 0 | Note 1 |

Note 1: This physical resource block is assigned to a virtual UE for transmission of NPDCCH or NPDSCH; the data transmitted over the NOCNG NPDCCH or NPDSCH shall be uncorrelated QPSK modulated pseudo random data. The parameter $\gamma_{PRB}$ is used to scale the power of NPDCCH and NPDSCH.
If two transmit antennas with NBRS are used in the test, the NPDCCH and NPDSCH parts of NOCNG shall be transmitted to the virtual users by both transmit antennas with NBRS and according to the antenna transmission mode 2. The parameter $\gamma_{PRB}$ applies to each antenna port separately, so the transmit power of the NPDCCH and NPDSCH parts of NOCNG is equal between both the transmit antennas with NBRS used in the test. The antenna transmission modes are specified in clause 7.1 in TS 36.213.
Note 2: Value of $\gamma_{PRB}$ is applicable to PRBs not used for transmission of NPSS, NSSS and NPBCH in anchor cell ( $n_{PRB}$ = 0).
Note 3: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in TS 36.211 [16].
Note 4: SI transmissions, and NPDCCH and NPDSCH for the UE under test, have precedence over NOCNG.
Note 5: Whether NPDSCH transmissions are carried out in DwPTS depends on the special subframe configuration in use.

## A.3.2.4 OCNG Patterns for V2X sidelink

The following V2X sidelink OCNG patterns (VOCNG) are used for modelling allocations to virtual V2X UEs (which are not under test). The OCNG pattern for each subframe specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case VOCNG is expressed by parameters VOCNG_RA and VOCNG_RB which together with a relative power level ( $\gamma$) specifies the PSSCH EPRE-to-RS EPRE ratios in OFDM symbols without and with reference symbols, respectively. The relative power, which is used for modelling boosting per virtual V2X UE allocation, is expressed by:

$$\gamma_i = PSSCH_RA/VOCNG_RA = PSSCH_RB/VOCNG_RB$$

where $\gamma_i$ denotes the relative power level of the *i:th* virtual V2X UE. The parameter settings of VOCNG_RA, VOCNG_RB, and the set of relative power levels $\gamma$ are chosen such that when also taking allocations to the UE under test into account, as given by a PSSCH reference channel.

Moreover the VOCNG pattern is accompanied by a PSCCH reference channel which specifies the control region. The number of PSCCH OFDM symbols in all subframes is the same as specified in the RMC used in the test.

### A.3.2.4.1 V2X sidelink OCNG TDD pattern 1: outer resource blocks allocation in 10 MHz

**Table A.3.2.4.1-1: VOP.1 HD: OCNG TDD Pattern 1**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | PSCCH and PSSCH Data |
|---|---|---|
| | Subframe Note 2 | |
| | 0 - 19 | |
| 0 – 4 | 18 | Note 1 |
| 10–25 | 18 | |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PSSCH per virtual UE; the data transmitted over the OCNG PSSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PSSCH. | | |
| Note 2: Value of $\gamma_{PRB}$ is applicable to subframes not used for V2X sidelink transmissions. | | |

### A.3.2.4.2 V2X sidelink OCNG TDD pattern 2: outer resource blocks allocation in 10 MHz

**Table A.3.2.4.2-1: VOP.2 HD: OCNG TDD Pattern 2**

| Allocation $n_{PRB}$ | Relative power level $\gamma_{PRB}$ [dB] | PSCCH and PSSCH Data |
|---|---|---|
| | Subframe Note 2 | |
| | 0 - 19 | |
| 0 – 4 | 18 | Note 1 |
| 10-14 | 18 | |
| 15 –19 | 8.1 | |
| 20–25 | 18 | |
| Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PSSCH per virtual UE; the data transmitted over the OCNG PSSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter $\gamma_{PRB}$ is used to scale the power of PSSCH. | | |
| Note 2: Value of $\gamma_{PRB}$ is applicable to subframes not used for V2X sidelink transmissions. | | |

## A.3.3 Reference DRX Configurations

**Table A.3.3-1: Reference DRX Configurations**

| Parameter | Value | | Comments |
|---|---|---|---|
| Reference configuration | DRX_S | DRX_L | As defined in 4.8.2.1.5 in TS 36.508 |
| onDurationTimer | psf2 | psf6 | |
| drx-InactivityTimer | psf100 | psf1920 | |
| drx-RetransmissionTimer | psf16 | psf16 | |
| longDRX-CycleStartOffset | sf40, 0 | sf1280, 0 | |
| shortDRX | disabled | disabled | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

# A.3.4 ABS Transmission Configurations

## A.3.4.1 Non-MBSFN ABS Transmission Configurations

### A.3.4.1.1 Non-MBSFN ABS Transmission, 1x2 antenna with PBCH

**Table A.3.4.1.1-1: Transmission configuration with non-MBSFN ABS, 1x2 with PBCH**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |
| PBCH | PBCH_RA | 0 | 0 |
| | PBCH_RB | 0 | 0 |
| PSS | PSS_RA | 0 | 0 |
| SSS | SSS_RA | 0 | 0 |
| PCFICH | PCFICH_RB | 0 | 0 Note 1 |
| PHICH | PHICH_RA | 0 | -Inf |
| | PHICH_RB | 0 | -Inf |
| PDCCH | PDCCH_RA | 0 | 0 Note 1 |
| | PDCCH_RB | 0 | 0 Note 1 |
| PDSCH | PDSCH_RA | 0 | 0 Note 1 |
| | PDSCH_RB | 0 | 0 Note 1 |
| OCNG | OCNG_RA | 0 | -Inf |
| | OCNG_RB | 0 | -Inf |
| NOTE 1: Only used for SIB1, otherwise EPRE is –Inf<br>NOTE 2: 1x2 antenna configuration is assumed | | | |

### A.3.4.1.2 Non-MBSFN ABS Transmission, 2x2 antenna without PBCH

**Table A.3.4.1.2-1: Transmission configuration #1 with non-MBSFN ABS, 2x2 without PBCH**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |
| PBCH | PBCH_RA | -3 | -Inf |
| | PBCH_RB | -3 | -Inf |
| PSS | PSS_RA | -3 | -3 |
| SSS | SSS_RA | -3 | -3 |
| PCFICH | PCFICH_RB | 1 | -Inf |
| PHICH | PHICH_RA | -3 | -Inf |
| | PHICH_RB | -3 | -Inf |
| PDCCH | PDCCH_RA | 1 | -Inf |
| | PDCCH_RB | 1 | -Inf |
| PDSCH | PDSCH_RA | -3 | -Inf |
| | PDSCH_RB | -3 | -Inf |
| OCNG | OCNG_RA | -3 | -Inf |
| | OCNG_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

**Table A.3.4.1.2-2: Transmission configuration #2 with non-MBSFN ABS, 2x2 without PBCH**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |
| PBCH | PBCH_RA | -3 | -Inf |
| | PBCH_RB | -3 | -Inf |
| PSS | PSS_RA | -3 | -3 |
| SSS | SSS_RA | -3 | -3 |
| PCFICH | PCFICH_RB | 1 | -Inf |
| PHICH | PHICH_RA | -3 | -Inf |
| | PHICH_RB | -3 | -Inf |
| PDCCH | PDCCH_RA | -3 | -Inf |

| | | | |
|---|---|---|---|
| | PDCCH_RB | -3 | -Inf |
| PDSCH | PDSCH_RA | -3 | -Inf |
| | PDSCH_RB | -3 | -Inf |
| OCNG | OCNG_RA | -3 | -Inf |
| | OCNG_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

## A.3.4.2 MBSFN ABS Transmission Configurations

### A.3.4.2.1 MBSFN ABS Transmission, 1x2 antenna

**Table A.3.4.2.1-1: Transmission configuration with MBSFN ABS, 1x2**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |
| PBCH | PBCH_RA | 0 | N/A |
| | PBCH_RB | 0 | N/A |
| PSS | PSS_RA | 0 | N/A |
| SSS | SSS_RA | 0 | N/A |
| PCFICH | PCFICH_RB | 0 | -Inf |
| PHICH | PHICH_RA | 0 | -Inf |
| | PHICH_RB | 0 | -Inf |
| PDCCH | PDCCH_RA | 0 | -Inf |
| | PDCCH_RB | 0 | -Inf |
| PDSCH | PDSCH_RA | 0 | -Inf |
| | PDSCH_RB | 0 | -Inf |
| PMCH | PMCH_RA | 0 | -Inf |
| | PMCH_RB | 0 | -Inf |
| OCNG | OCNG_RA | 0 | -Inf |
| | OCNG_RB | 0 | -Inf |
| NOTE: 1x2 antenna configuration is assumed | | | |

### A.3.4.2.2 MBSFN ABS Transmission, 2x2 antenna

**Table A.3.4.2.2-1: Transmission configuration #1 with MBSFN ABS, 2x2**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |
| PBCH | PBCH_RA | -3 | N/A |
| | PBCH_RB | -3 | N/A |
| PSS | PSS_RA | -3 | N/A |
| SSS | SSS_RA | -3 | N/A |
| PCFICH | PCFICH_RB | 1 | -Inf |
| PHICH | PHICH_RA | -3 | -Inf |
| | PHICH_RB | -3 | -Inf |
| PDCCH | PDCCH_RA | 1 | -Inf |
| | PDCCH_RB | 1 | -Inf |
| PDSCH | PDSCH_RA | -3 | -Inf |
| | PDSCH_RB | -3 | -Inf |
| PMCH | PMCH_RA | -3 | -Inf |
| | PMCH_RB | -3 | -Inf |
| OCNG | OCNG_RA | -3 | -Inf |
| | OCNG_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

**Table A.3.4.2.2-2: Transmission configuration # 2 with MBSFN ABS, 2x2**

| Physical Channels and Signals | Parameters | EPRE, [dB] | |
|---|---|---|---|
| | | Non-ABS | ABS |

| | | | |
|---|---|---|---|
| PBCH | PBCH_RA | -3 | N/A |
| | PBCH_RB | -3 | N/A |
| PSS | PSS_RA | -3 | N/A |
| SSS | SSS_RA | -3 | N/A |
| PCFICH | PCFICH_RB | 1 | -Inf |
| PHICH | PHICH_RA | -3 | -Inf |
| | PHICH_RB | -3 | -Inf |
| PDCCH | PDCCH_RA | -3 | -Inf |
| | PDCCH_RB | -3 | -Inf |
| PDSCH | PDSCH_RA | -3 | -Inf |
| | PDSCH_RB | -3 | -Inf |
| PMCH | PMCH_RA | -3 | -Inf |
| | PMCH_RB | -3 | -Inf |
| OCNG | OCNG_RA | -3 | -Inf |
| | OCNG_RB | -3 | -Inf |
| NOTE: 2x2 antenna configuration is assumed | | | |

## A.3.5 Impact of Reference Sensitivity Degradation with Carrier Aggregation on Test Cases

### A.3.5.1 Impact of Reference Sensitivity Degradation due to Insertion Loss

For a UE supporting inter-band carrier aggregation configuration with uplink in one E-UTRA band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}$>0 dB as defined in TS 36.101 [5], 7.3.1-1A, there is no adjustment of test parameters in the tests specified in TS 36.133 when $\Delta R_{IB,c} \leq 1$ dB.

## A.3.6 Carrier Aggregation Test Cases with Different Channel Bandwidth Combinations

### A.3.6.1 Introduction

In Annex A carrier aggregation test cases may be defined with different channel bandwidth combinations to verify the same RRM requirement.

If multiple carrier aggregation test cases with different channel bandwidth combinations are defined to verify the same RRM requirement that is channel bandwidth independent, then the UE needs to be tested only with one bandwidth combination out of the bandwidth combination sets supported by that UE.

## A.3.7 Test Cases with Different Channel Bandwidths

### A.3.7.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for single carrier operation.

### A.3.7.2 Principle of testing

Test cases defined for 5MHz channel bandwidth that reference this clause are applicable to UEs that support only bands within band group FDD_N.

## A.3.8 Antenna Configuration

Unless otherwise specified, E-UTRA FDD or E-UTRA TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

# A.3.8.1 Antenna connection for 4 Rx capable UEs

## A.3.8.1.1 Introduction

All tests in sections A.4 to A.9 are specified for UEs supporting either category 0 (1RX) or 2RX. In this section, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in section A.4-A.9 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

## A.3.8.1.2 Principle of testing

### A.3.8.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one 2RX band, all single carrier tests specified in section A.4 to A.8 shall be tested on any band where 2RX is supported with the antenna connection specified in A.8.3.1.2.3. For single carrier tests specified in section A.9, all tests shall be tested with the antenna connection specified in A.3.8.1.2.3 for bands where 2RX is supported, and the antenna connection specified in A.3.8.1.2.4 for bands where 4RX is supported.

For 4RX capable UEs which do not support any 2RX band, all tests specified in sections A.4 to A.9 shall be tested using the antenna connection specified in section A.3.8.1.2.4. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

**Table A.3.8.1.2.1-1 Modified parameters for RLM out of sync testing with 4 RX antenna connection**

| Test case | SNR during T3 (dB) | | | |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Test 4 |
| A.7.3.1 | -17 | -17 | -15 | -15.7 |
| A.7.3.3 | -16.6 | -16.7 | -14.8 | -15.4 |
| A.7.3.5 | -15.7 | -17 | N/A | N/A |
| A.7.3.7 | -15.4 | -16.6 | N/A | N/A |
| A.7.3.9 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.10 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.13 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.14 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.17 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.18 (cell 1) | Note 1 | N/A | N/A | N/A |
| A.7.3.23 | -15.7 | N/A | N/A | N/A |
| Note 1: For 4Rx capable UEs without any 2Rx supported RF bands,this test can be skipped. | | | | |

**Table A.3.8.1.2.1-2 Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection**

| Test case | SNR during T3 (dB) | | SNR during T4 (dB) | |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 1 | Test 2 |
| A.7.3.2 | -14 | -15.7 | -9.9 | -10.8 |
| A.7.3.4 | -14.8 | -15.4 | -9.9 | -10.8 |
| A.7.3.6 | -17 | N/A | -12.2 | N/A |
| A.7.3.8 | -16.6 | N/A | -12.6 | N/A |
| A.7.3.11 (cell 1) | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.12 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.15 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.16 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.19 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.20 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.21(cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.22 (cell 1)** | Note 1 | N/A | Note 1 | N/A |
| **A.7.3.24** | -15.7 | N/A | -10.8 | N/A |
| **A.7.3.25** | -15.7 | N/A | -10.8 | N/A |
| Note 1: For 4Rx capable UEs without any 2Rx supported RF bands,this test can be skipped. | | | | |

#### A.3.8.1.2.2 Carrier aggregation and Dual connectivity tests

All carrier aggregation and dual connectivity tests are performed using the antenna connection in section A.3.8.1.2.3 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.8.1.2.4 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation and dual connectivity tests are performed using the antenna connection in section A.3.8.1.2.3 for the SCell or PSCell antenna connection if an SCell or PSCell is on band where 2RX is supported or the testing procedure in A.3.8.1.2.4 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

For dual connectivity radio link monitoring tests with the PSCell on a band where 4RX is supported, the PSCell SNR levels are modified according to table A.3.8.1.2.2 -1 and table A.3.8.1.2.2 -2.

**Tabke A.3.8.1.2.1-1 Modified parameters for dual connectivity RLM out of sync testing with 4 RX antenna connection**

| Test case | SNR during T3 (dB) |
|---|---|
| A.7.3.38 (cell 2) | -15.7 (5MHz)<br>-15.7 (10MHz)<br>-16.3 (20 MHz) |
| A.7.3.39 (cell 2) | -15.7 (5MHz)<br>-15.7 (10MHz)<br>-16.3 (20 MHz) |
| A.7.3.40 (cell 2) | -15.4 (5MHz)<br>-15.4 (10MHz)<br>-16.1 (20MHz) |

**Table A.3.8.1.2.1-1 Modified parameters for RLM out of sync testing with 4 RX antenna connection**

| Test case | SNR during T3 (dB) | SNR during T4 (dB) |
|---|---|---|
| A.7.3.41 (cell 2) | -15.7 (5 Mhz)<br>-17.0 (10 Mhz)<br>-17.0 (20 Mhz) | -10.8 (5MHz)<br>-12.2 (10MHz)<br>-12.2 (20 MHz) |
| A.7.3.42 (cell 2) | -15.7 (5 Mhz)<br>-17.0 (10 Mhz)<br>-17.0 (20 Mhz) | -10.8 (5MHz)<br>-12.2 (10MHz)<br>-12.2 (20 MHz) |
| A.7.3.43 (cell 2) | -16.6 (5MHz)<br>-16.6 (10 MHz)<br>-16.6 (20 MHz) | -12.6 (5MHz)<br>-12.6 (10 MHz)<br>-12.6 (20 MHz) |

#### A.3.8.1.2.3 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaning 2 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

#### A.3.8.1.2.4 Antenna connection for bands where 4RX is supported

For bands where 4RX is supporetd, all 4 Rx are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring theresholds described in sections A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

### A.3.8.2 Antenna connection for 8 Rx capable UEs

#### A.3.8.2.1 Introduction

In this clause, the antenna connection method for applying 2RX tests or 4RX tests to UEs supporting 8RX antenna ports is specified. No tests are currently specified in clause A.4-A.9 which are applicable only to 8RX antenna ports, so 8RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs or 4Rx UEs.

### A.3.8.2.2 Principle of testing

#### A.3.8.2.2.1 Single carrier tests

For 8RX capable UEs supporting at least one 2RX band, all single carrier tests specified in clause A.4 to A.8 shall be tested on any band where 2RX is supported with the antenna connection specified in A.8.3.2.2.3. For single carrier tests specified in clause A.9, all tests shall be tested with the antenna connection specified in A.3.8.2.2.3 for bands where 2RX is supported, and the antenna connection specified in A.3.8.2.2.5 for bands where 8RX is supported.

For 8RX capable UEs supporting at least one 4RX band but without supporting any 2RX band, all single carrier tests specified in clause A.4 to A.8 shall be tested on any band where 4RX is supported with the antenna connection specified in A.3.8.2.2.4. For single carrier tests specified in clause A.9, all tests shall be tested with the antenna connection specified in A.3.8.2.2.4 for bands where 4RX is supported, and the antenna connection specified in A.3.8.2.2.8 for bands where 8RX is supported. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

For 8RX capable UEs which do not support any 2RX or 4RX band, all tests specified in clauses A.4 to A.9 shall be tested using the antenna connection specified in clause A.3.8.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.8.1.2.1-1 and table A.3.8.1.2.1-2.

#### A.3.8.2.2.2 Carrier aggregation and Dual connectivity tests

All carrier aggregation and dual connectivity tests are performed using the antenna connection in clause A.3.8.2.2.3 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.8.2.2.4 for the PCell antenna connection if the PCell is on a band where 4RX is supported but without supporting any 2RX band or the antenna connection in A.3.8.2.2.5 for the PCell antenna connection if the PCell is on a band where 8RX is supported.

All carrier aggregation and dual connectivity tests are performed using the antenna connection in clause A.3.8.2.2.3 for the SCell or PSCell antenna connection if an SCell or PSCell is on band where 2RX is supported or the testing procedure in A.3.8.2.2.4 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 4RX is supported but without supporting any 2RX band or the testing procedure in A.3.8.2.2.5 for the SCell or PSCell antenna connection if an SCell or PSCell is on a band where 8RX is supported.

For dual connectivity radio link monitoring tests with the PSCell on a band where 8RX is supported, the PSCell SNR levels are modified according to table A.3.8.1.2.2 -1 and table A.3.8.1.2.2 -2.

#### A.3.8.2.2.3 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 8 Rx ports are connected with data source from system simulator. The remaning 6 Rx ports shall be connected with zero input**.** No test parameters or requirements are modified.

#### A.3.8.2.2.4 Antenna connection for bands where 4RX is supported

For bands where 4RX is supporetd, it is left to the UE declaration and AP configuration to decide which 4 of the 8 Rx ports are connected with data source from system simulator. The remaning 4 Rx ports shall be connected with zero input**.** Except for the modifications to radio link monitoring theresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

#### A.3.8.2.2.5 Antenna connection for bands where 8RX is supported

For bands where 8RX is supporetd, all 8 Rx are connected with data source from system simulator**.** The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring theresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

## A.3.9 Carrier Aggregation Test Cases with Different Duplex Modes

### A.3.9.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation.

### A.3.9.2 Principle of testing

In Annex A carrier aggregation test cases may be defined for different duplex modes or combination of duplex modes (E-UTRA FDD, E-UTRA TDD and E-UTRA TDD-FDD) to verify the same RRM requirement.

If multiple carrier aggregation test cases are defined for different duplex modes (E-UTRA FDD or E-UTRA TDD) or for combination of duplex modes (E-UTRA TDD-FDD) to verify the same RRM requirement which is independent of the duplex mode and is identical for different duplex modes or combination of duplex modes, then from UE the performance point of view the test coverage can be considered fulfilled by executing only the corresponding test case(s) with one of the duplex modes supported by the UE.

## A.3.10 Carrier Aggregation Test Cases with Different CA Configurations

### A.3.10.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation.

### A.3.10.2 Principle of testing

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the test cases with the maximum number of CCs supported by the UE.

*Editor's note:* whether it is sufficient to test for any one of the band combinations supported by the UE is FFS.

## A.3.11 Test Cases for Synchronous and Asynchronous Dual Connectivity

### A.3.11.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation in synchronous and asynchronous scenarios.

### A.3.11.2 Principle of Testing

In Annex A test cases may be defined in both synchronous DC and asynchronous DC scenarios to verify the same RRM requirement.

If test cases are defined in both synchronous and asynchronous DC scenarios to verify the same RRM requirement then the UE capable of both synchronous and asynchronous DC operations needs to be tested with one of the tests in either synchronous or asynchronous DC scenarios.

# A.3.12 Proximity-based Services

## A.3.12.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for ProSe Direct Discovery and ProSe Direct Communication.

## A.3.12.2 Reference DRX configurations for ProSe tests

**Table A.3.12.2-1: Reference DRX Configurations**

| Parameter | Value |
|---|---|
| Reference configuration | DRX_P1 |
| onDurationTimer | psf1 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf320, 0 |
| shortDRX | Disabled |
| Note: For further information see clause 6.3.2 in TS 36.331. | |

## A.3.12.3 Test Cases with Different Channel Bandwidths

### A.3.12.3.1 Introduction

This clause defines a principle which is applicable to test cases verifying ProSe RRM requirements with different channel bandwidths.

### A.3.12.3.2 Principle of testing

Some ProSe test cases are defined for different channel bandwidths to verify the same RRM requirement.

If test cases with different channel bandwidth are defined to verify the same RRM requirement then the UE is required to pass the test cases only with one of the channel bandiwdths.

## A.3.12.4 Reference resource pool configurations for ProSe Direct Discovery

**Table A.3.12.4-1: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #1)**

| Information Element | | | | Value |
|---|---|---|---|---|
| *discRxPool* | *cp-Len* | | | Normal |
| | *discPeriod* | | | rf32 |
| | *numRetx* | | | 0 |
| | *numRepetition* | | | 1 |
| | *tf-ResourceConfig* | *prb-Num* | | 12 |
| | | *prb-Start* | | 0 |
| | | *prb-End* | | 23 |
| | | *offsetIndicator* | | 160 |
| | | *subframeBitmap* | | 11000000<br>00000000<br>00000000<br>00000000<br>00000000 |
| | *txParameters* | | | not present |
| | *rxParameters* | | | not present |
| *discTxPoolCommon/ discTxPoolDedicated* | *cp-Len* | | | Normal |
| | *discPeriod* | | | rf32 |
| | *numRetx* | | | 0 |
| | *numRepetition* | | | 1 |

| | | | | |
|---|---|---|---|---|
| | *tf-ResourceConfig* | *prb-Num* | | 2 |
| | | *prb-Start* | | 3 |
| | | *prb-End* | | 5 |
| | | *offsetIndicator* | | 160 |
| | | *subframeBitmap* | | 10000000 00000000 00000000 00000000 00000000 |
| | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
| | | | *p0* | 31 |
| | | *ue-SelectedResourceConfig* | *poolSelection* | random |
| | | | *txProbability* | p100 |
| | *rxParameters* | | | not present |
| *discTxPowerInfo* | *discMaxTxPower* | | | 23 |
| *SL-SyncConfig* | *syncCP-Len* | | | Normal |
| | *syncOffsetIndicator* | | | 35 (155 mod 40) |
| | *slssid* | | | 30 |
| | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
| | | | *p0* | 31 |
| | | *syncTxThreshIC* | | 0 (-infinity) |
| | *rxParamsNCell* | | | not present |
| *discInterFreqList* | | | | not present |

**Table A.3.12.4-2: ProSe Direct Discovery configuration for E-UTRA FDD (Configuration #2)**

| Information Element | | | | Value |
|---|---|---|---|---|
| *discRxPool* | *cp-Len* | | | Normal |
| | *discPeriod* | | | rf32 |
| | *numRetx* | | | 0 |
| | *numRepetition* | | | 1 |
| | *tf-ResourceConfig* | *prb-Num* | | 12 |
| | | *prb-Start* | | 0 |
| | | *prb-End* | | 23 |
| | | *offsetIndicator* | | 160 |
| | | *subframeBitmap* | | 11000000 00000000 00000000 00000000 00000000 |
| | *txParameters* | | | not present |
| | *rxParameters* | *tdd-Config* | | not present |
| | | *syncConfigIndex* | | 0 |
| *discTxPoolCommon/ discTxPoolDedicated* | | | | not present |
| *discTxPowerInfo* | *discMaxTxPower* | | | 23 |
| *SL-SyncConfig* | *syncCP-Len* | | | Normal |
| | *syncOffsetIndicator* | | | 20 (140 mod 40) |
| | *slssid* | | | 30 |
| | *txParameters* | | | not present |
| | *rxParamsNCell* | *physCellId* | | 1 |
| | | *discSyncWindow* | | w1 |
| *discInterFreqLis* | | | | not present |

**Table A.3.12.4-3: ProSe Direct Discovery configuration for E-UTRA TDD Config 0 (Configuration #3)**

| Information Element | | | | Value |
|---|---|---|---|---|
| *discRxPool* | *cp-Len* | | | Normal |
| | *discPeriod* | | | rf32 |
| | *numRetx* | | | 0 |
| | *numRepetition* | | | 1 |
| | *tf-ResourceConfig* | *prb-Num* | | 12 |

| | | | | |
|---|---|---|---|---|
| | | *prb-Start* | | 0 |
| | | *prb-End* | | 23 |
| | | *offsetIndicator* | | 163 |
| | | *subframeBitmap* | | 11000000 00000000 00000000 00000000 00000000 00 |
| | *txParameters* | | | not present |
| | *rxParameters* | | | not present |
| *discTxPoolCommon/ discTxPoolDedicated* | *cp-Len* | | | Normal |
| | *discPeriod* | | | rf32 |
| | *numRetx* | | | 0 |
| | *numRepetition* | | | 1 |
| | *tf-ResourceConfig* | *prb-Num* | | 2 |
| | | *prb-Start* | | 3 |
| | | *prb-End* | | 5 |
| | | *offsetIndicator* | | 163 |
| | | *subframeBitmap* | | 10000000 00000000 00000000 00000000 00000000 00 |
| | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
| | | | *p0* | 31 |
| | | *ue-SelectedResourceConfig* | *poolSelection* | random |
| | | | *txProbability* | p100 |
| | *rxParameters* | | | not present |
| *discTxPowerInfo* | *discMaxTxPower* | | | 23 |
| *SL-SyncConfig* | *syncCP-Len* | | | Normal |
| | *syncOffsetIndicator* | | | 38 (158 mod 40) |
| | *slssid* | | | 30 |
| | *txParameters* | *txParametersGeneral* | *alpha* | al0 |
| | | | *p0* | 31 |
| | | *syncTxThreshIC* | | 0 (-infinity) |
| | *rxParamsNCell* | | | not present |
| *discInterFreqList* | | | | not present |

**Table A.3.12.4-4: ProSe Direct Discovery configuration for E-UTRA FDD for PS discovery (Configuration #4)**

| Information Element | | | | Value |
|---|---|---|---|---|
| *discConfig* | | | | not present |
| *discInterFreqList* | | | | not present |
| *discConfig-v1310* | | | | not present |
| *discConfigPS* | *discRxPoolPS* | *cp-Len* | | Normal |
| | | *discPeriod-v1310* | | rf4 |
| | | *numRetx* | | 0 |
| | | *numRepetition* | | 1 |
| | | *tf-ResourceConfig* | *prb-Num* | 12 |
| | | | *prb-Start* | 0 |
| | | | *prb-End* | 23 |
| | | | *offsetIndicator* | 20 |
| | | | *subframeBitmap* | 11000000 00000000 00000000 00000000 00000000 |
| | | *txParameters* | | not present |
| | | *rxParameters* | *tdd-Config* | not present |
| | | | *syncConfigIndex* | 0 |

| | | | | |
|---|---|---|---|---|
| | *discTxPoolPS-Common/ discTxPoolPS-Dedicated* | | | not present |
| *discConfigRelay* | *relayUE-Config* | *threshHigh* | | not present |
| | | *threshLow* | | not present |
| | | *hystMax* | | not present |
| | | *hystMin* | | not present |
| | *remoteUE-Config* | *threshHigh* | | 0 (-130dBm) |
| | | *hystMax* | | dB0 |
| | | *reselectionInfoIC* | *q-RxLevMin* | (-94dBm) |
| | | | *filterCoefficient* | fc0 |
| | | | *minHyst* | dB3 |

**Table A.3.12.4-5: ProSe Direct Discovery configuration for E-UTRA FDD for inter-frequency discovery (Configuration #5)**

| Information Element | | | Value |
|---|---|---|---|
| *discConfig* | | | not present |
| *discInterFreqList* | *carrierFreq* | | Note 1 |
| | *plmn-IdentityList* | | not present |
| *discConfig-v1310* | | | |
| *discInterFreqList-v1310* | | | |
| *discResourcesNonPS* | *discRxResourcesInterFreq* | *cp-Len* | Normal |
| | | *discPeriod* | rf32 |
| | | *numRetx* | 0 |
| | | *numRepetition* | 1 |
| | | *tf-ResourceConfig* | |
| | | *prb-Num* | 12 |
| | | *prb-Start* | 0 |
| | | *prb-End* | 23 |
| | | *offsetIndicator* | 160 |
| | | *subframeBitmap* | 11000000 00000000 00000000 00000000 00000000 |
| | | *txParameters* | not present |
| | | *rxParameters* | not present |
| | | *rxParamsAddNeighFreq* | |
| | | *physCellId* | Note 1 |
| | *discTxResourcesInterFreq* | *discTxPoolCommon* | |
| | | *cp-Len* | Normal |
| | | *discPeriod* | rf32 |
| | | *numRetx* | 0 |
| | | *numRepetition* | 1 |
| | | *tf-ResourceConfig* | |
| | | *prb-Num* | 2 |
| | | *prb-Start* | 3 |
| | | *prb-End* | 5 |
| | | *offsetIndicator* | 160 |
| | | *subframeBitmap* | 10000000 00000000 00000000 00000000 00000000 |
| | | *txParameters* | |
| | | *txParametersGeneral* | |
| | | *alpha* | al0 |
| | | *p0* | 31 |
| | | *ue-SelectedResourceConfig* | |
| | | *poolSelection* | |
| | | *txProbability* | p100 |
| | | *rxParameters* | not present |

| | | | |
|---|---|---|---|
| | | *rxParamsAddNeighFreq* | not present |
| | | *txParamsAddNeighFreq* | |
| | | *physCellId* | Note 1 |
| | | *p-Max* | 23 |
| | | *tdd-Config* | not present |
| | | *tdd-Config-v1130* | not present |
| | | *freqInfo* | |
| | | *ul-CarrierFreq* | Note 1 |
| | | *ul-Bandwidth* | n25 |
| | | *additionalSpectrumEmission* | NS_01 |
| | | *referenceSignalPower* | Note 2 |
| | | *syncConfigIndex* | not present |
| *discResourcesPS* | | | not present |
| *discConfigOther* | *txPowerInfo* | *discMaxTxPower* | 23 |
| | *refCarrierCommon* | | not present |
| | *discSyncConfig* | | not present |
| | *discCellSelectionInfo* | *q-RxLevMin* | -70 (-140dBm) |
| | | *q-RxLevMinOffset* | not present |
| | | *q-Hyst* | dB0 |
| | | *q-RxLevMinReselection* | -70 (-140dBm) |
| | | *t-ReselectionEUTRA* | 0 |
| *gapRequestsAllowedCommon* | | | True |
| *discConfigRelay* | | | not present |
| *discConfigPS* | | | not present |
| NOTE 1: As specified in the test.<br>NOTE 2: As configured by the test system. | | | |

## A.3.12.5 Reference resource pool configurations for ProSe Direct Communication

**Table A.3.12.5-1: ProSe Direct Communication configuration for E-UTRA FDD (Configuration #1)**

| Information Element | | | | Value (5MHz) | Value (10MHz) |
|---|---|---|---|---|---|
| *commRxPool* | *sc-CP-Len* | | | Normal | |
| | *sc-Period* | | | sf40 | |
| | *sc-TF-ResourceConfig* | *prb-Num* | | 12 | 25 |
| | | *prb-Start* | | 0 | 0 |
| | | *prb-End* | | 23 | 49 |
| | | *offsetIndicator* | | 0 | |
| | | *subframeBitmap* | | 00011000<br>00000000<br>00000000<br>00000000<br>00000000 | |
| | *data-CP-Len* | | | Normal | |
| | *dataHoppingConfig* | *hoppingParameter* | | 0 | |
| | | *numSubbands* | | ns1 | |
| | | *rb-Offset* | | 0 | |
| | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | 25 |
| | | | *prb-Start* | 0 | 0 |
| | | | *prb-End* | 23 | 49 |
| | | | *offsetIndicator* | 0 | |
| | | | *subframeBitmap* | 00000000<br>11111111<br>11111111<br>11111111<br>11111111 | |
| | | *trpt-Subset-r12* | | 001 | |
| | *rxParametersNCell* | | | not present | |

| | | | | | |
|---|---|---|---|---|---|
| | *txParameters* | | | not present | |
| *commTxPoolNormalCommon/ commTxPoolNormalDedicated* | *sc-CP-Len* | | | Normal | |
| | *sc-Period* | | | sf40 | |
| | *sc-TF-ResourceConfig* | *prb-Num* | | 12 | 25 |
| | | *prb-Start* | | 0 | 0 |
| | | *prb-End* | | 24 | 49 |
| | | *offsetIndicator* | | 0 | |
| | | *subframeBitmap* | | 00011000<br>00000000<br>00000000<br>00000000<br>00000000 | |
| | *data-CP-Len* | | | Normal | |
| | *dataHoppingConfig* | *hoppingParameter* | | 0 | |
| | | *numSubbands* | | ns1 | |
| | | *rb-Offset* | | 0 | |
| | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | 25 |
| | | | *prb-Start* | 0 | 0 |
| | | | *prb-End* | 23 | 49 |
| | | | *offsetIndicator* | 0 | |
| | | | *subframeBitmap* | 00000000<br>11111111<br>11111111<br>11111111<br>11111111 | |
| | | *trpt-Subset-r12* | | 001 | |
| | *rxParametersNCell* | | | not present | |
| | *txParameters* | *sc-TxParameters* | *alpha* | al0 | |
| | | | *p0* | 31 | |
| | | *dataTxParameters* | *alpha* | al0 | |
| | | | *p0* | 31 | |
| *SL-SyncConfig* | *syncCP-Len* | | | Normal | |
| | *syncOffsetIndicator* | | | 2 | |
| | *slssid* | | | 30 | |
| | *txParameters* | *txParametersGeneral* | *alpha* | al0 | |
| | | | *p0* | 31 | |
| | | *syncTxThreshIC* | | 0 (-infinity) | |
| | *rxParamsNCell* | | | not present | |

**Table A.3.12.5-2: ProSe Direct Communication pre-configuration for E-UTRAN FDD for out-of-network coverage operation (Configuration #2)**

| **Information Element** | | | | **Value (5MHz)** | **Value (10MHz)** |
|---|---|---|---|---|---|
| *preconfigSync* | *syncCP-Len-r12* | | | Normal | |
| | *syncOffsetIndicator1* | | | 2 | |
| | *syncOffsetIndicator2* | | | 1 | |
| | *syncTxParameters* | | | 31 | |
| | *syncTxThreshOoC* | | | 0<br>(-110dBm / 15kHz) | |
| | *filterCoefficient* | | | fc0 | |
| | *syncRefMinHyst* | | | dB0 | |
| | *syncRefDiffHyst* | | | dB0 | |
| *preconfigComm* | *sc-CP-Len* | | | Normal | |
| | *sc-Period* | | | sf40 | |
| | *sc-TF-ResourceConfig* | *prb-Num* | | 12 | 25 |
| | | *prb-Start* | | 0 | 0 |
| | | *prb-End* | | 23 | 49 |
| | | *offsetIndicator* | | 0 | |
| | | *subframeBitmap* | | 00011000<br>00000000<br>00000000<br>00000000 | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 00000000 | |
| | *data-CP-Len* | | | Normal | |
| | *dataHoppingConfig* | *hoppingParameter* | | 0 | |
| | | *numSubbands* | | ns1 | |
| | | *rb-Offset* | | 0 | |
| | *ue-SelectedResourceConfig* | *data-TF-ResourceConfig* | *prb-Num* | 12 | 25 |
| | | | *prb-Start* | 0 | 0 |
| | | | *prb-End* | 23 | 49 |
| | | | *offsetIndicator* | 0 | |
| | | | *subframeBitmap* | 00000000<br>11111111<br>11111111<br>11111111<br>11111111 | |
| | | *trpt-Subset-r12* | | 001 | |

## A.3.12.6 Reference Measurement Channels for ProSe Direct Discovery

### A.3.12.6.1 FDD

**Table A.3.12.6-1: PSDCH Reference Measurement Channels for FDD**

| Parameter | Unit | Value |
|---|---|---|
| Reference channel | | D.1 FDD |
| Channel bandwidth | MHz | 5 |
| Allocated resource blocks | | 2 |
| Subcarriers per resource block | | 12 |
| Allocated subframes per Discovery period | | 1 |
| DFT-OFDM Symbols per subframe (see note) | | 11 |
| Modulation | | QPSK |
| Information Bit Payload | | 232 |
| Transport block CRC | Bits | 24 |
| Maximum number of HARQ transmissions | | 1 |
| Binary Channel Bits (see note) | Bits | 528 |
| NOTE1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. | | |

## A.3.12.7 Reference measurement channels for ProSe Direct Communication

### A.3.12.7.1 FDD

**Table A.3.12.7-1: PSCCH Reference Measurement Channels for FDD**

| Parameter | | Unit | Value | |
|---|---|---|---|---|
| Reference channel | | | CC.1 FDD | CC.2 FDD |
| Channel bandwidth | | MHz | 5 | 10 |
| Allocated resource blocks | | | 1 | 1 |
| Subcarriers per resource block | | | 12 | 12 |
| DFT-OFDM Symbols per subframe (see Note 1) | | | 11 | 11 |
| Modulation | | | QPSK | QPSK |
| Information Bit Payload | | Bits | 41 | 43 |
| Information bits | Frequency hopping flag | | 0 | |
| | RB assignment | | Set as per PSSCH RB allocation specific in the test | |
| | Time resource pattern ($I_{TRP}$) | | 0 (Note 2) | |
| | Modulation and coding scheme | | Set as the PSSCH MCS specified in the test | |

| | | | | |
|---|---|---|---|---|
| | Timing advance indication | | 0 | |
| | Group destination ID | | As set by higher layers | |
| Transport block CRC | | Bits | 16 | 16 |
| Maximum number of HARQ transmissions | | | 2 | 2 |
| Binary Channel Bits (see Note 1) | | Bits | 264 | 264 |
| NOTE1: PSCCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.<br>NOTE 2: For $N_{TRP}$ = 8 (FDD) and *trpt-Subset* = 001, $I_{TRP}$ = 0 corresponds to a time repetition pattern of (1,0,0,0,0,0,0,0) as per TS 36.213. | | | | |

**Table A.3.12.7-1: PSSCH Reference Measurement Channels for FDD**

| Parameter | Unit | Value | |
|---|---|---|---|
| Reference channel | | CD.1 FDD | CD.2 FDD |
| Channel bandwidth | MHz | 5 | 10 |
| Allocated resource blocks | | 2 | 3 |
| Subcarriers per resource block | | 12 | 12 |
| DFT-OFDM Symbols per subframe (see Note 1) | | 11 | 11 |
| Modulation | | QPSK | QPSK |
| Target Code Rate | | 1/3 | 1/3 |
| Information Bit Payload | | 176 | 256 |
| Transport block CRC | Bits | 24 | 24 |
| Maximum number of HARQ transmissions | | 3 | 3 |
| Binary Channel Bits (see note) | Bits | 528 | 1056 |
| NOTE1: PSDCH transmissions are rate-matched for 12 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211. | | | |

## A.3.12.8 ProSe Receive Traffic Generator

This clause defines the configuration for active Sidelink UEs used to generate receive traffic in ProSe RRM tests.

### A.3.12.8.1 ProSe Direct Communication Receive Traffic Generator for FDD

**Table A.3.12.8.1-1: Active Sidelink UE configuration for ProSe Direct Communication**

| Configuration | | | PCP.1.FDD |
|---|---|---|---|
| Channel BW | | MHz | 5 or 10 |
| Number of Active Sidelink UEs per sc-period | | | 5 MHz: 12<br>10 MHz: 16 |
| Active Sidelink UEs | PSCCH RMC (defined in A.3.12.7) | | 5 MHz: CC.1 FDD<br>10 MHz: CC.2 FDD |
| | PSCCH resource allocation | | 5MHz: [2i:2i], for Sidelink UE i=0,..,11<br>10MHz:[3i:3i], for Sidelink UE i = 0, .., 15 |
| | PSSCH RMC (defined in A.3.12.7) | | 5 MHz: CD.1 FDD<br>10 MHz: CD.2 FDD |
| | PSSCH resource allocation | | Non-overlapping RBs<br>5MHz: [2i:2i+1], for Sidelink UE i = 0, .., 11<br>10MHz:[3i:3i+2], for Sidelink UE i = 0, .., 15 |
| | RSRP | dBm/15kHz | -98 |

### A.3.12.8.2 ProSe Direct Discovery Receive Traffic Generator for FDD

**Table A.3.12.8.2-1: Active Sidelink UE configuration for ProSe Direct Discovery**

| Configuration | | | PDP.1.FDD | PDP.2.FDD |
|---|---|---|---|---|
| Channel BW | | MHz | 5 | |
| Number of Active Sidelink UEs per Discovery subframe | | | 12 | |
| Active Sidelink UEs | Sidelink UE Transmissions | | PSDCH (RMC D.1 FDD) | PSDCH (RMC D.1 FDD) |

| | | | | |
|---|---|---|---|---|
| | | | | + SLSS on synchronization subframe |
| | Resource allocation | | Non overlapping RBs in a subframe | |
| | RSRP | dBm/15kHz | -95 | |

## A.3.13 Time Offset between Cells

### A.3.13.1 Introduction

In Annex A in some test cases a parameter called, ‘time offset between cells’ is used. The meaning of this parameter is defined in this clause.

### A.3.13.2 Definition

Unless explicitly stated otherwise, the time offset between cells for a pair of cells is defined as the difference between radio frame start timings of the pair of cells.

## A.3.14 Carrier Aggregation under operation with Frame Structure 3 Test Cases with Different Duplex Modes

### A.3.14.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for carrier aggregation with at least one Scell under operation with Frame Structure 3.

### A.3.14.2 Principle of testing

In Annex A, tests for carrier aggregation with at least one Scell under operation with frame structure 3are specified with both an FDD and a TDD Pell to verify the same RRM requirement. If both types of tests are relevant to a UE considering supported CA bands, the test coverage can be considered fulfilled by executing either the tests with FDD PCell or the tests with TDD PCell and the UE is not required to pass both tests.

## A.3.15 Dual connectivity test cases with different combination of duplex mode

### A.3.15.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation with different combination of duplex modes.

### A.3.15.2 Principle of testing

If multiple dual connectivity test cases are defined for different combination of duplex modes (E-UTRA FDD-FDD, E-UTRA TDD-TDD and E-UTRA TDD-FDD) to verify the same RRM requirement which is independent of the combination of duplex modes and is identical for different combination of duplex modes, then from UE the performance point of view the test coverage can be considered fulfilled by executing only the corresponding test case(s) with one of the combination of duplex modes supported by the UE.

## A.3.16 Reference PRACH Configurations

**Table A.3.16-1: PRACH configuration parameters**

| Parameter | Value | | | Comments |
|---|---|---|---|---|
| Reference configuration | PRACH_2CE | PRACH_3CE | PRACH_4CE | |
| Rsrp-ThresholdsPRACH | {-99} dBm | {-107, -99} dBm | {-107, -99, -92} dBm | As defined in TS36.331 |
| CE level 0: | Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | 4 | 4 | 4 | See TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | 1 | 1 | 1 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | off | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 1: | Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | 4 | 4 | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | 128 | 64 | 32 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | off | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 2: | Not Configured | Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | - | 4 | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | - | 128 | 64 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | - | off | off | Coverage level specific frequency hopping configuration for PRACH |
| CE level 3: | Not Configured | Not Configured | Configured | Up to 4 CE levels, each corrsesonding to a PRACH configuration |
| Prach Configuration Index: | - | - | 4 | see TS 36.211 section 5.7.1 |
| numRepetitionPerPreambleAttempt: | - | - | 128 | Number of PRACH repetitions per attempt for each CE level, See TS 36.211 |
| prach-HoppingConfig: | - | - | off | Coverage level specific frequency hopping configuration for PRACH |

## A.3.17 Listen before talk model

### A.3.17.1 Introduction

In some RRM test cases for FS3, a listen before talk (LBT) model is specified. The intention of the LBT model is to emulate using test equipment the behaviour of an FS3 eNB which performs channel measurement to check that the channel is clear prior to performing downlink transmission.

### A.3.17.2 Definition

Prior to each DMTC window, the test equipment shall determine whether to transmit a discovery reference signal (DRS) during the DMTC window with probability P=0.75. In many cases the test requirement depends on the number of configured discovery signal occasions which are not available during the test, so the test equipment shall track how

many DRS are not transmitted during the test period. If the test equipment determines that it shall transmit a DRS, then the timing of the DRS transmission within the DMTC window is randomly selected from the set of possible DRS transmission signal timings, such that there is an equal probability of any valid DRS timing.

For non DRS downlink transmission bursts, if transmission occurred in the previous subframe, transmission is muted for a duration of one subframe. Additionaly, if the start time of the candidate transmission burst is within 8 subframes of the start of the DMTC window, transmission is not performed. Otherwise

The length of the transmission burst in subframes is defined as N. The burst transmission format is determined according to the steps below:

1. Select N randomly from a given set of the number of subframes $S_1$={1,3,5,8} with equal probability as the total length of burst transmission format.

2. A uniform random variable from 0 to 1 is generated. If the random variable is less than P=0.75, a burst of N fully occupied subframes is transmitted. Otherwise, the burst transmission is muted and the muting duration is the same as the number N of subframes for determined burst format.

## A.3.18 Reference NPRACH Configurations

Table A.3.18-1 and A.3.18-2 define the reference NB-IoT PRACH configurations for a NB-IoT RRM test case where the UE is required to transmit NPRACH during the testing procedure, but the testing purpose of the RRM test case does not include testing NPRACH performance.

**Table A.3.18-1: NPRACH.R-1: HD-FDD Reference NPRACH Configuration**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH coverage level** | | | | |
| rsrp-ThresholdsPrach | {rsrp1, rsrp2} | | | The values of NPRACH RSRP thresholds for will be set according the requirement of individual test cases |
| nprach-CP-Length | us66dot7 | | | NPRACH format 0 |
| **Parameters per NPRACH coverage Level** | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | **Valid values as defined in TS 36.331 [2]** |
| nprach-Periodicity | ms40 | ms40 | ms40 | {ms40, ms80, ms160, ms240, ms320, ms640, ms1280, ms2560} |
| nprach-StartTime | ms8 | ms8 | ms8 | {ms8, ms16, ms32, ms64, ms128, ms256, ms512, ms1024} |
| nprach-SubcarrierOffset | n0 | n0 | n0 | {n0, n12, n24, n36, n2, n18, n34} |
| nprach-NumSubcarriers | n12 | n12 | n12 | {n12, n24, n36, n48} |
| nprach-SubcarrierMSG3-RangeStart | {one} | {one} | {one} | {zero, oneThird, twoThird, one} |
| maxNumPreambleAttemptCE | n3 | n5 | n7 | {n3, n4, n5, n6, n7, n8, n10} |
| numRepetitionsPerPreambleAttempt | n1 | n8 | n32 | {n1, n2, n4, n8, n16, n32, n64, n128} |
| npdcch-NumRepetitions-RA | r1 | r8 | r32 | {r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048} |
| npdcch-StartSF-CSS-RA | v8 | v2 | v2 | {v1dot5, v2, v4, v8, v16, v32, v48, v64} |
| npdcch-Offset-RA | zero | zero | zero | {zero, oneEighth, oneFourth, threeEighth} |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | {n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n48} |
| Note 1: See Clause 6.7.3.2 in TS 36.331 [2] for further information on the parameters in this table. | | | | |

**Table A.3.18-2: NPRACH.R-2: TDD Reference NPRACH Configuration**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH coverage level** | | | | |
| rsrp-ThresholdsPrach | {rsrp1, rsrp2} | | | The values of NPRACH RSRP thresholds for will be set according the requirement of individual test cases |
| nprach-PreambleFormat | fmt-0 | | | See TS 36.211 [16] section 10.1.6 |
| **Parameters per NPRACH coverage Level** | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | **Valid values as defined in TS 36.331 [2]** |
| nprach-Periodicity | ms80 | ms80 | ms80 | {ms80, ms160, ms320, ms640, ms1280, ms2560, ms5120, ms10240} |
| nprach-StartTime | ms10 | ms10 | ms10 | {ms10, ms20, ms40, ms80, ms160, ms320, ms640, ms1280, ms 2560, ms5120} |
| nprach-SubcarrierOffset | n0 | n0 | n0 | {n0, n12, n24, n36, n2, n18, n34} |
| nprach-NumSubcarriers | n12 | n12 | n12 | {n12, n24, n36, n48} |
| nprach-SubcarrierMSG3-RangeStart | {one} | {one} | {one} | {zero, oneThird, twoThird, one} |
| maxNumPreambleAttemptCE | n3 | n5 | n7 | {n3, n4, n5, n6, n7, n8, n10} |
| numRepetitionsPerPreambleAttempt | n1 | n8 | n32 | {n1, n2, n4, n8, n16, n32, n64, n128, n256, n512, n1024} |
| npdcch-NumRepetitions-RA | r1 | r8 | r32 | {r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048} |
| npdcch-StartSF-CSS-RA | v8 | v4 | v4 | {v4, v8, v16, v32, v48, v64, v96, v128} |
| npdcch-Offset-RA | zero | zero | zero | {zero, oneEighth, oneFourth, threeEighth} |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | {n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n48} |
| Note 1: See Clause 6.7.3.2 in TS 36.331 [2] for further information on the parameters in this table. | | | | |

# A.3.19 Dual connectivity test cases with different bandwidth combinations

## A.3.19.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for dual connectivity (DC) operation with different bandwidth combinations.

## A.3.19.2 Principle of testing

If multiple dual connectivity test cases with different channel bandwidth combinations are defined to verify the same RRM requirement that is channel bandwidth independent, then the UE needs to be tested only with one bandwidth combination out of the bandwidth combination sets supported by that UE.

# A.3.20 Category M1 UE Test Cases

## A.3.20.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category M1 UE in both CEModeA and CEModeB.

## A.3.20.2 Principle of Cat-M1 UE Testing

In Annex A Cat-M1 UE test cases may be defined for both CEModeA and CEModeB to verify the same type of RRM requirement.

If test cases are defined in both CEModeA and CEmodeB in order to verify the same type of RRM requirement then the UE capable of CEModeB needs to be tested for the corresponding test(s) defined in CEModeA and/or in CEModeB according to the applicability rules defined in Table A.3.20.2-1.

The UE which is not capable of CEModeB shall be tested for all CEModeA test cases defined in Annex A.

In test cases defined for CEModeB, test equipment shall transmit PBCH with 5 repetitions as specified in section 6.6.4 of TS 36.211 [16].

**Table A.3.20.2-1: Test case applicability rules for category M1 UE in CEModeA and CEModeB**

| Type of Test Cases | Coverage mode(s) Applicable for Testing | |
|---|---|---|
| | CEModeA | CEModeB |
| A.4 E-UTRAN RRC IDLE State: Intra-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.4 E-UTRAN RRC IDLE State: Intrer-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency with SFN acquisition Handover Tests for Category M1 UE | X | |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency with SFN acquisition Handover Tests for Category M1 UE | X | |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency without SFN acquisition Handover Tests for Category M1 UE | | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency without SFN acquisition Handover Tests for Category M1 UE | | X |
| A.5 RRC Connection Control: E-UTRAN Intra-frequency RRC Re-Restablishment Tests for Category M1 UE | | X |
| A.5 RRC Connection Control: E-UTRAN Inter-frequency RRC Re-Restablishment Tests for Category M1 UE | | X |
| A.6 E-UTRAN Contention Based Random Access Tests for Cat-M1 UE | | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN UE Transmit Timing Timing Accuracy Tests for Category M1 UE | | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN Timing Advance Adjustment Accuracy Tests for Cat-M1 UE | | X |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for Category M1 UE | X | |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for for Early In-sync and Early Out-of-sync for Category M1 UE | | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Serving Cell Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE without Gaps | X | N/A |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Identification of a New CGI of E-UTRA cell using Autonomous Gaps Tests for Category M1 UE | N/A | X |
| A.8 Measurements Procedures: E-UTRAN Inter-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8.12 Measurements Procedures: E-UTRAN Intra-frequency RSTD measurement reporting delay tests for Category M1 UE | X | X |

| | | |
|---|---|---|
| A.8.13 Measurements Procedures: E-UTRAN Inter-frequency RSTD measurement reporting delay tests for Category M1 UE | X | X |
| A.9 Measurement Performance Requirements: RSRP Intra-Frequency Measurement Accuracy Tests for Category M1 UE | X | X |
| A.9.7 Measurement Performance Requirements: E-UTRAN UE Rx–Tx Time Difference Measurement Accuracy Tests for Category M1 UE | X | N/A |
| A.9.8 Measurement Performance Requirements: E-UTRAN Intra-frequency RSTD Measurement Accuracy Tests for Category M1 UE | X | X |
| A.9.8 Measurement Performance Requirements: E-UTRAN Inter-frequency RSTD Measurement Accuracy Tests for Category M1 UE | X | X |

### A.3.20.3 Principle of Cat-M1 UE testing for inter-frequency RSTD measurement period requirements with measurement gaps

For the Cat-M1 UE, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps, it is sufficient to verify the RSTD measurement period requirements only under the applicable measurement gaps specified in Table 8.1.2.1-3, for each of the CEModeA and CEModeB.

## A.3.21 V2V Sidelink Communication on Dedicated V2V Carrier

### A.3.21.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for V2V sidelink communication on dedicated V2V carrier.

### A.3.21.2 Reference resource pool configurations for V2V Sidelink Communication

**Table A.3.21.2-1: Pre-configuration for V2V Sidelink Communication**

| Derivation Path: TS 36.331 [3] clause 9.3.2, SL-V2X-Preconfiguration | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| SL-V2X-PreconfigCommPool-r14 ::= SEQUENCE { | | | |
| sl-OffsetIndicator-r14 | 0 | Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. | |
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | 10000000000000000000<br>10000000000000000000<br>10000000000000000000<br>10000000000000000000<br>10000000000000000000 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) | |
| sl-Subframe-r14 included in SL-PreconfigV2X-RxPoolList | 11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111 | Indicates the bitmap of the RX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) | |
| adjacencyPSCCH-PSSCH-r14 | True | Adjacent: TURE<br>Non-adjacent: FALSE | |
| sizeSubchannel-r14 | 5 | Minimum bandwidth of subchannel for adjacent transmission | |
| startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. | |
| startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool | |
| } | | | |

## A.3.21.3 Reference measurement channels for V2V Sidelink Communication

**Table A.3.21.3-1: PSCCH Reference Measurement Channels**

| Parameter | | Unit | Value |
|---|---|---|---|
| Reference channel | | | CC.1 |
| Channel bandwidth | | MHz | 10 |
| Allocated PSCCH resource blocks | | | 2 |
| DFT-OFDM symbols per subframe (see Note 1) | | | 9 |
| Modulation | | | QPSK |
| Information Bit Payload (without CRC) | | Bits | 32 |
| Information Bit | SCI Format | | 1 |
| | Priority | | As set by higher layers |
| | Resource reservation | | 0 |
| | Modulation and coding scheme | | Set as the PSSCH MCS specified in the test |
| | Retransmission index | | Note 4 |
| | Time gap between initial transmission and retransmission | | 0 (Note 2) |
| | Frequency resource location of the initial transmission and retransmission | | Initial transmission: Set as per PSSCH RB allocation specific in the test<br>Retransmission: Note 4 |
| | Reserved bits | | Set all these bits to 0 |
| Transport block CRC | | Bits | 16 |
| Binary Channel Bits (see Note 3) | | Bits | 432 |

Note 1: PSCCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.

Note 2: $SF_{gap}$ is the value indicated by "Time gap between initial transmission and retransmission" field in the configured sidelink grant, and $SF_{gap}$ =0 means no retransmission of the associated TB as per TS 36.213.

Note 3: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe.

Note 4: UE is allowed to autonomously select the un-used or redundant bits/code-points in SCI format 1

**Table A.3.21.3-2: PSSCH Reference Measurement Channels**

| Parameter | Unit | Value |
|---|---|---|
| Reference channel | | CD.1 |
| Sidelink transmission mode | | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks | | 3 |
| DFT-OFDM symbols per subframe (see Note 1) | | 9 |
| Modulation | | QPSK |
| Target Code Rate | | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 208 |
| Transport block CRC | Bits | 24 |
| Number of PSSCH HARQ retransmissions | | 0 |
| Binary Channel Bits (see Note 2) | Bits | 648 |

Note1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.

Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe.

# A.3.22 Category 1bis UE Test Cases

## A.3.22.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category 1bis UE.

## A.3.22.2 Principle of Category 1bis UE Testing

In Annex A, tests in table A.3.22.2-1 defined for Category ≥1 UE with 2 Rx antenna are applicable to Category 1bis UE with 1 Rx antenna. Unless otherwise specified, same test configurations are used except for propagation channel change to 1x1 or 2x1 according to number of Tx antennas. For RSRP and RSRQ measurement accuracy test, corresponding measurement accuracy requirement for Category 1bis UE is specified in the table. For band dependent RRM tests defined in section A.9, only subset of bands that are defined for Cat.1bis UE are applicable.

**Table A.3.22.2-1: Test cases applicable to category 1bis UE**

| Test category | Test case | Test case name |
|---|---|---|
| Cell re-selection tests | A.4.2.20 | E-UTRAN FDD – FDD Intra frequency case for UE Category 1bis |
| | A.4.2.21 | E-UTRAN TDD – TDD Intra frequency case for UE Category 1bis |
| | A.4.2.31 | E-UTRAN FDD – FDD Inter frequency case for UE Category 1bis |
| | A.4.2.32 | E-UTRAN FDD – TDD Inter frequency case for UE Category 1bis |
| | A.4.2.33 | E-UTRAN TDD – FDD Inter frequency case for UE Category 1bis |
| | A.4.2.34 | E-UTRAN TDD – TDD: Inter frequency case for UE Category 1bis |
| Handover tests | A.5.1.19 | E-UTRAN FDD - FDD Intra frequency handover for UE Category 1bis |
| | A.5.1.20 | E-UTRAN TDD - TDD Intra frequency handover for UE Category 1bis |
| | A.5.1.3 | E-UTRAN FDD – FDD Inter frequency handover |
| | A.5.1.4 | E-UTRAN TDD – TDD Inter frequency handover |
| | A.5.1.5 | E-UTRAN FDD – FDD Inter frequency handover: unknown target cell |
| | A.5.1.6 | E-UTRAN TDD – TDD Inter frequency handover; unknown Target Cell |
| | A.5.1.7 | E-UTRAN FDD – TDD Inter frequency handover |
| | A.5.1.8 | E-UTRAN TDD – FDD Inter frequency handover |
| RRC re-establishment tests | A.6.1.1 | E-UTRAN FDD Intra-frequency RRC Re-establishment |
| | A.6.1.2 | E-UTRAN FDD Inter-frequency RRC Re-establishment |
| | A.6.1.3 | E-UTRAN TDD Intra-frequency RRC Re-establishment |
| | A.6.1.4 | E-UTRAN TDD Inter-frequency RRC Re-establishment |
| Random access tests | A.6.2.1 | E-UTRAN FDD – Contention Based Random Access Test |
| | A.6.2.2 | E-UTRAN FDD – Non-Contention Based Random Access Test |
| | A.6.2.3 | E-UTRAN TDD – Contention Based Random Access Test |
| | A.6.2.4 | E-UTRAN TDD – Non-Contention Based Random Access Test |
| RRC connection release with redirection tests | A.6.3.1 | Redirection from E-UTRAN FDD to UTRAN FDD |
| | A.6.3.2 | Redirection from E-UTRAN TDD to UTRAN FDD |
| | A.6.3.3 | Redirection from E-UTRAN FDD to GERAN when System Information is provided |
| | A.6.3.4 | Redirection from E-UTRAN TDD to GERAN when System Information is provided |
| | A.6.3.5 | E-UTRA TDD RRC connection release redirection to UTRA TDD |
| | A.6.3.6 | E-UTRA FDD RRC connection release redirection to UTRA TDD |
| | A.6.3.7 | E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided |
| | A.6.3.8 | E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided |
| | A.6.3.9 | Redirection from E-UTRAN FDD to UTRAN FDD without System Information |
| | A.6.3.10 | Redirection from E-UTRAN FDD to GERAN when System Information is not provided |
| | A.6.3.11 | Redirection from E-UTRAN TDD to GERAN when System Information is not provided |
| | A.6.3.12 | E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided |
| UE transmit timing tests | A.7.1.1 | E-UTRAN FDD – UE Transmit Timing Accuracy Tests |
| | A.7.1.2 | E-UTRAN TDD - UE Transmit Timing Accuracy Tests |
| UE timing advance tests | A.7.2.1 | E-UTRAN FDD – UE Timing Advance Adjustment Accuracy Test |
| | A.7.2.2 | E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test |

| | | |
|---|---|---|
| Radio link monitoring tests | A.7.3.26 | E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for UE Category 0 |
| | A.7.3.27 | E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync for UE Category 0 |
| | A.7.3.28 | E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0 |
| | A.7.3.29 | E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category 0 |
| | A.7.3.34 | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for UE Category 0 |
| | A.7.3.35 | E-UTRAN TDD Radio Link Monitoring Test for In-sync for UE category 0 |
| | A.7.3.36 | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0 |
| | A.7.3.37 | E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for UE category 0 |
| Event-triggered reporting | A.8.1.11 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category 0 |
| | A.8.1.12 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0 |
| | A.8.1.13 | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX for UE category 0 |
| | A.8.2.12 | E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells |
| | A.8.2.13 | E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX |
| | A.8.3.1 | E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells |
| | A.8.3.2 | E-UTRAN FDD-FDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells |
| | A.8.3.3 | E-UTRAN FDD-FDD inter-frequency event triggered reporting under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used |
| | A.8.4.1 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells |
| | A.8.4.2 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in synchronous cells |
| | A.8.4.3 | E-UTRAN TDD-TDD inter-frequency event triggered reporting under AWGN propagation conditions in synchronous cells with DRX when L3 filtering is used |
| | A.8.4.6 | E-UTRAN TDD-TDD Inter-frequency event triggered reporting for TDD UL/DL configuration 0 |
| CGI reading tests | A.8.1.19 | E-UTRAN FDD-FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0 |
| | A.8.1.20 | E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0 |
| | A.8.2.7 | E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps |
| | A.8.2.8 | E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX |
| RSTD measurement reporting delay test | A.8.12.1 | E-UTRAN FDD intra-frequency RSTD measurement reporting delay test case |
| | A.8.12.2 | E-UTRAN TDD intra-frequency RSTD measurement reporting delay test case |
| | A.8.13.1 | E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency |
| | A.8.13.2 | E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency |
| RSRP measurement accuracy tests | A.9.1.1 | FDD Intra frequency case<br>Measurement accuracy requirement in 9.1.2.7 and 9.1.2.8 |
| | A.9.1.2 | TDD Intra frequency case<br>Measurement accuracy requirement in 9.1.2.7 and 9.1.2.8 |
| | A.9.1.3 | FDD—FDD Inter frequency case<br>Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| | A.9.1.4 | TDD—TDD Inter frequency case<br>Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| | A.9.1.5 | FDD—TDD Inter frequency case |

| | | |
|---|---|---|
| | | Measurement accuracy requirement in 9.1.3.3 and 9.1.3.4 |
| RSRQ measurement accuracy tests | A.9.2.1 | FDD Intra frequency case<br>Measurement accuracy requirement in 9.1.5.5 |
| | A.9.2.2 | TDD Intra frequency case<br>Measurement accuracy requirement in 9.1.5.5 |
| | A.9.2.3 | FDD—FDD Inter frequency case<br>Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| | A.9.2.4 | TDD—TDD Inter frequency case<br>Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| | A.9.2.4A | FDD—TDD Inter frequency case<br>Measurement accuracy requirement in 9.1.6.5 and 9.1.6.6 |
| UE Rx-Tx time difference measurement accuracy tests | A.9.7.1 | E-UTRAN FDD UE Rx – Tx time difference case |
| | A.9.7.2 | E-UTRA TDD |
| RSTD measurement accuracy tests | A.9.8.1 | E-UTRAN FDD RSTD intra frequency case<br>Measurement accuracy requirement in 9.1.10.5 |
| | A.9.8.2 | E-UTRAN TDD RSTD intra frequency case<br>Measurement accuracy requirement in 9.1.10.5 |
| | A.9.8.3 | E-UTRAN FDD-FDD RSTD inter frequency case<br>Measurement accuracy requirement in 9.1.10.6 |
| | A.9.8.4 | E-UTRAN TDD-TDD RSTD inter frequency case<br>Measurement accuracy requirement in 9.1.10.5 |

# A.3.23 Category NB2 UE Test Cases

## A.3.23.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category NB2 UE in both normal and enhanced coverage.

## A.3.23.2 Principle of Category NB2 UE Testing

In Annex A, test cases in table A.3.23.2-1 defined for Category NB1 UE are applicable to Category NB2 UE.

**Table A.3.23.2-1: Test cases applicable to Category NB2 UE**

| Test category | Section | Test case |
|---|---|---|
| Cell re-selection | A.4.2.18 | HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage |
| | A.4.2.19 | HD – FDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| | A.4.2.24 | HD – FDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| | A.4.2.35 | TDD - TDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage |
| | A.4.2.36 | TDD – TDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| | A.4.2.37 | TDD – TDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage |
| Serving cell measurement relaxation | A.4.2.38 | HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with serving cell RRM measurement relaxation |
| Idle RSTD measurement | A.4.7.1 | HD – FDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage |
| | A.4.7.2 | HD – FDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage |
| | A.4.7.3 | TDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage |
| | A.4.7.4 | TDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage |

| | | |
|---|---|---|
| RRC re-establishment | A.6.1.15 | HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhancednormal coverage |
| | A.6.1.16 | HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normalenhanced coverage |
| | A.6.1.23 | TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage |
| | A.6.1.24 | TDD - TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage |
| Random access | A.6.2.16 | HD-FDD Random Access Test for UE category NB1 in In-band Mode under Normal Coverage |
| | A.6.2.17 | HD-FDD Contention Based Random Access Test for UE category NB1s in In-band Mode in Enhanced Coverage |
| | A.6.2.18 | HD-FDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage |
| | A.6.2.19 | TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage |
| | A.6.2.20 | TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in enhanced coverage |
| | A.6.2.21 | TDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage |
| UE transmit timing | A.7.1.17 | E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage |
| | A.7.1.18 | E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage |
| | A.7.1.27 | TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage |
| | A.7.1.28 | TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage |
| UE timing advance | A.7.2.9 | HD-FDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhance Coverage |
| | A.7.2.15 | TDD – TDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage |
| Radio link monitoring | A.7.3.60 | HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage |
| | A.7.3.61 | HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage |
| | A.7.3.62 | HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| | A.7.3.63 | HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage |
| | A.7.3.64 | HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage |
| | A.7.3.65 | HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| | A.7.3.66 | HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE category NB1 in Standalone Mode in Normal Coverage |
| | A.7.3.67 | HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE category NB1 in Guardband Mode under Enhanced Coverage |
| | A.7.3.88 | TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage |
| | A.7.3.89 | TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage |
| | A.7.3.90 | TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage |
| | A.7.3.91 | TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| | A.7.3.92 | TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage |
| | A.7.3.93 | TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage |
| | A.7.3.94 | TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 Standalone mode in Normal Coverage |
| | A.7.3.95 | TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 guard band mode in Enhanced Coverage |
| RSTD measurement accuracy | A.9.8.16 | HD – FDD Intra frequency case for UE Category NB1 inband mode in normal coverage |

| | | |
|---|---|---|
| | A.9.8.17 | HD – FDD Inter frequency case for UE Category NB1 inband mode in normal coverage |
| | A.9.8.18 | HD – FDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage |
| | A.9.8.19 | HD – FDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage |
| | A.9.8.32 | TDD Intra frequency case for UE Category NB1 inband mode in normal coverage |
| | A.9.8.33 | TDD Inter frequency case for UE Category NB1 inband mode in normal coverage |
| | A.9.8.34 | TDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage |
| | A.9.8.35 | TDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage |
| Channel quality reporting accuracy | A.9.14.1 | E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under normal coverage |
| | A.9.14.2 | E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under enhanced coverage |

# A.3.24 V2X sidelink communication

## A.3.24.1 Introduction

This clause also defines the principle and the reference configurations that are applicable to test cases verifying RRM core requirements for V2X sidelink communication.

## A.3.24.2 Reference resource pool configurations for V2X Sidelink Communication

**Table A.3.24.2-1: Pre-configuration for V2X Sidelink Communication (Configuration #1)**

| Derivation Path: TS 36.331 [3] clause 9.3.2, SL-V2X-Preconfiguration | | | |
|---|---|---|---|
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| SL-V2X-PreconfigCommPool-r14 ::= SEQUENCE { | | | |
| sl-OffsetIndicator-r14 | 0 | Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. | |
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | 11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) | |
| sl-Subframe-r14 included in SL-PreconfigV2X-RxPoolList | 11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111 | Indicates the bitmap of the RX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) | |
| adjacencyPSCCH-PSSCH-r14 | True | Adjacent: TURE<br>Non-adjacent: FALSE | |
| sizeSubchannel-r14 | 5 | Minimum bandwidth of subchannel for adjacent transmission | |
| startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. | |
| startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool | |
| } | | | |

**Table A.3.24.2-2: V2X sidelink Communication configuration for E-UTRAN (Configuration #2)**

| Derivation Path: 36.331 clause 6.3.8 | | | | |
|---|---|---|---|---|
| **Information Element** | | | **Value (10MHz)** | **Comment** |
| SL-V2X-InterFreqUE-Config-r14 ::= SEQUENCE { | | | | |
| | physCellIdList-r14 | | | Not present |
| | typeTxSync-r14 | | *Set according to the specific test configuration* | ENUMERATED {gnss, enb, ue } |
| | v2x-SyncConfig-r14 | | | Not present |
| | v2x-CommRxPool-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { | | RxPool<br>A monitoring UE can receive on the resources of this pool when a transmitting UE uses the Tx Pool Normal or Tx Pool Exceptional |
| | | sl-OffsetIndicator-r14 | 0 | small-r12<br>Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0. |
| | | sl-Subframe-r14 | 11111111<br>11111111<br>1111 | bs20-r14 for FDD<br>Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| | | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN<br>Adjacent: TURE<br>Non-adjacent: FALSE |
| | | sizeSubchannel-r14 | 50 | ENUMERATED {n50}<br>Minimum bandwidth of subchannel for adjacent transmission |
| | | numSubchannel-r14 | 1 | ENUMERATED {n1}<br>Number of subchannel for adjacent transmission |
| | | startRB-Subchannel-r14 | 0 | Indicates the lowest RB index of the subchannel with the lowest index. |
| | | startRB-PSCCH-Pool-r14 | 0 | Indicates the lowest RB index of the PSCCH pool |
| | | } | | |
| | v2x-CommTxPoolNormal-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { | | Tx Pool Normal |
| | | sl-OffsetIndicator-r14 | 0 | small-r12 |
| | | sl-Subframe-r14 | 11111111<br>11111111<br>0000 | bs20-r14 |
| | | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN |
| | | sizeSubchannel-r14 | 50 | ENUMERATED {n50} |
| | | numSubchannel-r14 | 1 | ENUMERATED {n1} |
| | | startRB-Subchannel-r14 | 0 | |
| | | startRB-PSCCH-Pool-r14 | 0 | |
| | | dataTxParameters-r14 SEQUENCE { | | |

| | | | | |
|---|---|---|---|---|
| | | alpha-r12 | al0 | Sidelink power control: al0 corresponds to 0 |
| | | p0-r12 | 31 | INTEGER (-126..31), unit dBm |
| | | } | | |
| | | } | | |
| | v2x-CommTxPoolExceptional-r14 | SL-CommResourcePoolV2X -r14 SEQUENCE { | | Tx Pool Exceptional |
| | | sl-OffsetIndicator-r14 | 0 | small-r12 |
| | | sl-Subframe-r14 | 00000000 00000000 1111 | bs20-r14 |
| | | adjacencyPSCCH-PSSCH-r14 | TRUE | BOOLEAN |
| | | sizeSubchannel-r14 | 50 | ENUMERATED {n50} |
| | | numSubchannel-r14 | 1 | ENUMERATED {n1} |
| | | startRB-Subchannel-r14 | 0 | |
| | | startRB-PSCCH-Pool-r14 | 0 | |
| | | dataTxParameters-r14 SEQUENCE { | | |
| | | alpha-r12 | al0 | Sidelink power control: al0 corresponds to 0 |
| | | p0-r12 | 31 | INTEGER (-126..31), unit dBm |
| | | } | | |
| | | } | | |
| | p2x-CommTxPoolNormal-r14 | | | Not present |
| | v2x-ResourceSelectionConfig-r14 | SL-CommTxPoolSensingConfig-r14 ::= SEQUENCE { | | |
| | | pssch-TxConfigList-r14 ::= SEQUENCE { | SL-PSSCH-TxConfig-r14 | |
| | | typeTxSync-r14 | *Set according to the specific test configuration* | ENUMERATED {gnss, enb, ue} |
| | | thresUE-Speed-r14 | kmph200 | |
| | | parametersAboveThres-r14 SEQUENCE { | | |
| | | minMCS-PSSCH-r14 | 0 | |
| | | maxMCS-PSSCH-r14 | 15 | |
| | | minSubChannel-NumberPSSCH-r14 | 1 | |
| | | maxSubchannel-NumberPSSCH-r14 | 1 | |
| | | allowedRetxNumberPSSCH-r14 | Both | |
| | | maxTxPower-r14 | Not present | |
| | | } | | |
| | | parametersBelowThres-r14 SEQUENCE { | | |
| | | minMCS-PSSCH-r14 | 4 | |
| | | maxMCS-PSSCH-r14 | 25 | |
| | | minSubChannel-NumberPSSCH-r14 | 1 | |
| | | maxSubchannel-NumberPSSCH-r14 | 1 | |
| | | allowedRetxNumberPSSCH-r14 | n1 | |
| | | maxTxPower-r14 | Not present | |
| | | } | | |
| | | } | | |
| | | thresPSSCH-RSRP-List-r14 SEQUENCE (SIZE (64)) OF SL-ThresPSSCH-RSRP-r14 { | | |
| | | SL-ThresPSSCH-RSRP-r14[n] | 1 | For n=1,2,…,64, where n denotes the index for the threshold used for sensing based UE |

| | | | | |
|---|---|---|---|---|
| | | | | autonomous resource selection |
| | | } | | |
| | | restrictResourceReservationPeriod-r14 | {v1} | BIT STRING (SIZE (10)) |
| | | probResourceKeep-r14 | v0 | |
| | | } | | |
| | zoneConfig-r14 | | | Not present |
| } | | | | |

## A.3.24.3 Reference measurement channels for V2X Sidelink Communication

**Table A.3.24.3-1: PSCCH Reference Measurement Channels**

| Parameter | | Unit | Value |
|---|---|---|---|
| Reference channel | | | CC.1A HD |
| Channel bandwidth | | MHz | 10 |
| Allocated PSCCH resource blocks | | | 2 |
| DFT-OFDM symbols per subframe (see Note 1) | | | 9 |
| Modulation | | | QPSK |
| Information Bit Payload (without CRC) | | Bits | 32 |
| Information Bit | SCI Format | | 1 |
| | Priority | | As set by higher layers |
| | Resource reservation | | 0 |
| | Modulation and coding scheme | | Set as the PSSCH MCS specified in the test |
| | Retransmission index | | Note 4 |
| | Time gap between initial transmission and retransmission | | 0 (Note 3) |
| | Frequency resource location of the initial transmission and retransmission | | Initial transmission: Set as per PSSCH RB allocation specific in the test<br>Retransmission: Note 4 |
| | Reserved bits | | Set all these bits to 0 |
| Transport block CRC | | Bits | 16 |
| Binary Channel Bits (see Note 2) | | Bits | 432 |

Note 1: PSCCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.

Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe.

Note 3: $SF_{gap}$ is the value indicated by "Time gap between initial transmission and retransmission" field in the configured sidelink grant, and $SF_{gap}$ =0 means no retransmission of the associated TB as per TS 36.213.

Note 4: UE is allowed to autonomously select the un-used or redundant bits/code-points in SCI format 1

**Table A.3.24.3-2: PSSCH Reference Measurement Channels**

| Parameter | Unit | Value |
|---|---|---|
| Reference channel | | CD.1A HD |
| Sidelink transmission mode | | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks | | 48 |
| DFT-OFDM symbols per subframe (see Note 1) | | 9 |
| Modulation | | QPSK |
| Target Code Rate | | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 3496 |
| Transport block CRC | Bits | 24 |

| | | |
|---|---|---|
| Number of PSSCH HARQ retransmissions | | 0 |
| Binary Channel Bits (see Note 2) | Bits | 10368 |
| Note 1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.<br>Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe. | | |

**Table A.3.24.3-3: PSSCH Reference Measurement Channels**

| Parameter | Unit | Value |
|---|---|---|
| Reference channel | | CD.1B HD |
| Sidelink transmission mode | | 4 |
| Channel bandwidth | MHz | 10 |
| Allocated PSSCH resource blocks | | 3 |
| DFT-OFDM symbols per subframe (see Note 1) | | 9 |
| Modulation | | QPSK |
| Target Code Rate | | 1/3 |
| Information Bit Payload (Transport block size) | Bits | 208 |
| Transport block CRC | Bits | 24 |
| Number of PSSCH HARQ retransmissions | | 0 |
| Binary Channel Bits (see Note 2) | Bits | 648 |
| Note 1: PSSCH transmissions are rate-matched for 10 DFT-OFDM symbols per subframe, and the last symbol shall be punctured as per TS 36.211.<br>Note 2: Binary channel bits calculated under assumption of 9 DFT-OFDM symbols per subframe. | | |

# A.3.25 Category M2 UE Test Cases

## A.3.25.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for Category M2 UE in both CEModeA and CEModeB.

## A.3.25.2 Principle of Cat-M2 UE Testing

In Annex A Cat-M2 UE test cases may be defined for both CEModeA and CEModeB to verify the same type of RRM requirement.

If test cases are defined in both CEModeA and CEmodeB in order to verify the same type of RRM requirement then the UE capable of CEModeB needs to be tested for the corresponding test(s) defined in CEModeA and/or in CEModeB according to the applicability rules defined in Table A.3.25.2-1.

The UE which is not capable of CEModeB shall be tested for all CEModeA test cases defined in Annex A.

**Table A.3.25.2-1: Test case applicability rules for category M2 UE in CEModeA and CEModeB**

| Type of Test Cases | Coverage mode(s) Applicable for Testing | |
|---|---|---|
| | CEModeA | CEModeB |
| A.4 E-UTRAN RRC IDLE State: Intra-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.4 E-UTRAN RRC IDLE State: Intrer-frequency Cell Re-Selection Tests for Category M1 UE | X | X |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency with SFN acquisition Handover Tests for Category M1 UE | X | |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency with SFN acquisition Handover Tests for Category M1 UE | X | |
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Intra-frequency without SFN acquisition Handover Tests for Category M1 UE | | X |

| | | |
|---|---|---|
| A.5 E-UTRAN RRC CONNECTED Mode Mobility: E-UTRAN Inter-frequency without SFN acquisition Handover Tests for Category M1 UE | | X |
| A.5 RRC Connection Control: E-UTRAN Intra-frequency RRC Re-Restablishment Tests for Category M1 UE | | X |
| A.5 RRC Connection Control: E-UTRAN Inter-frequency RRC Re-Restablishment Tests for Category M1 UE | | X |
| A.6 E-UTRAN Contention Based Random Access Tests for Cat-M1 UE | | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN UE Transmit Timing Timing Accuracy Tests for Category M2 UE | | X |
| A.7 Timing and Signalling Characteristics: E-UTRAN Timing Advance Adjustment Accuracy Tests for Cat-M1 UE | | X |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for Category M1 UE | X | |
| A.7.3 Radio Link Monitoring: E-UTRAN Radio Link Monitoring Tests for for Early In-sync and Early Out-of-sync for Category M1 UE | | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Inter-frequency Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE | X | X |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Serving Cell Event Triggered Reporting under Fading Propagation Conditions Tests for Category M1 UE without Gaps | X | N/A |
| A.8 Measurements Procedures: E-UTRAN Intra-frequency Identification of a New CGI of E-UTRA cell using Autonomous Gaps Tests for Category M1 UE | N/A | X |
| A.8.12 Measurements Procedures: E-UTRAN Intra-frequency RSTD measurement reporting delay tests for Category M2 UE | X | X |
| A.8.13 Measurements Procedures: E-UTRAN Inter-frequency RSTD measurement reporting delay tests for Category M2 UE | X | X |
| A.9 Measurement Performance Requirements: RSRP Intra-Frequency Measurement Accuracy Tests for Category M2 UE | X | X |
| A.9.7 Measurement Performance Requirements: E-UTRAN UE Rx–Tx Time Difference Measurement Accuracy Tests for Category M2 UE | X | N/A |
| A.9.8 Measurement Performance Requirements: E-UTRAN Intra-frequency RSTD Measurement Accuracy Tests for Category M2 UE | X | X |
| A.9.8 Measurement Performance Requirements: E-UTRAN Inter-frequency RSTD Measurement Accuracy Tests for Category M2 UE | X | X |

## A.3.25.3 Principle of Cat-M2 UE testing for inter-frequency RSTD measurement period requirements with measurement gaps

For the Cat-M2 UE configured with 1.4 MHz UE RF bandwidth, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps it is sufficient to verify the requirement only under the applicable measurement gaps specified in Table 8.1.2.1-3, for each of the CEModeA and CEModeB.

For the Cat-M2 UE in CEModeB configured with 5 MHz UE RF bandwidth, capable of supporting measurement gaps specified in Table 8.1.2.1-3 and requiring gaps for inter-frequency RSTD measurements, and which can be configured with applicable measurement gaps specified in Table 8.1.2.1-1 or Table 8.1.2.1-3, in order to verify inter-frequency RSTD measurement period with measurement gaps it is sufficient to verify the requirement only under the applicable measurement gaps specified in Table 8.1.2.1-3.

## A.3.26 sTTI and processing time reduction test cases with different sTTI/processing time reduction scheme

### A.3.26.1 Introduction

This clause defines a principle which is applicable to RRM performance requirement test cases with different TTI duration and processing time for a UE configured with *ShortTTI-r15* or *ShortProcessingTime=TRUE*.

### A.3.26.2 Principle of testing

If multiple test cases defined for different TTI duration and processing time are applicable to a UE configured with *ShortTTI-r15* or *ShortProcessingTime=TRUE* to verify the timing advance adjustment delay, from the UE performance point of view the test coverage can be considered fulfilled by executing only the test case with the shortest TTI duration and processing time among all the TTI duration and processing time supported by the UE. For a UE capable of *ShortTTI-r15* and *dl-STTI-Length-r15=subslot* configuration and *ProcessingTimelineSet-r15=set1*, coverage is fulfilled by executing only the test with configured *ShortTTI-r15*, *dl-STTI-Length-r15= subslot*, and *proc-Timeline-r15= nplus4set1*, and for a UE capable of *ShortTTI-r15* and *dl-STTI-Length-r15=subslot* configuration and *ProcessingTimelineSet-r15=set2*, coverage is fulfilled by executing only the test with configured *ShortTTI-r15*, *dl-STTI-Length-r15= subslot*, and *proc-Timeline-r15=nplus6set2*.

## A.3.27 LTE INACTIVE Cell Re-selection Test Cases

### A.3.27.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for INACTIVE mode cell-reselection under connectivity to 5GC.

### A.3.27.2 Principle of INACTIVE cell re-selection Testing

For a UE supporting RRC_INACTIVE state, the requirements in Section 4A are considered fulfilled if the UE passes the cell-reselection test cases defined in Section A.4 for RRC_IDLE state.

# A.4 E-UTRAN RRC_IDLE state

## A.4.2 Cell Re-Selection

### A.4.2.1 E-UTRAN FDD – FDD Intra frequency case

#### A.4.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.1.1-1 and A.4.2.1.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.1.1-1: General test parameters for FDD intra frequency cell reselection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |

| | | | | |
|---|---|---|---|---|
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| | | | | |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.1.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.1.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluateFDD,intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluateFDD,intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.2 E-UTRAN TDD – TDD Intra frequency case

### A.4.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.2.1-1 and A.4.2.2.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.2.1-1: General test parameters for TDD intra frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Time offset between cells | | µs | 3 | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.2.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | | 0 | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.2.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_\ intra} + T_{SI\text{-}EUTRA}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,E-UTRAN_intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.3 E-UTRAN FDD – FDD Inter frequency case

### A.4.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.3.1-1 and A.4.2.3.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.3.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.3.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $\hat{E}_s/I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s/N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.3.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateFDD,inter} + T_{SI}$ , and to lower priority cell can be expressed as: $T_{evaluateFDD,inter} + T_{SI}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluateFDD,inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

# A.4.2.4 E-UTRAN FDD – TDD Inter frequency case

## A.4.2.4.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA FDD cell and 1 E-UTRA TDD cell as given in tables A.4.2.4.1-1 and A.4.2.4.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.4.1-1: General test parameters for FDD-TDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | | | 1 | One FDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | | | 2 | One TDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.4.1-2: Cell specific test parameters for FDD-TDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) | | OP.2 FDD | | | OP.2 TDD | | |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | 0 | | | 0 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.4.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

# A.4.2.5 E-UTRAN TDD – FDD Inter frequency case

## A.4.2.5.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA TDD cell and 1 E-UTRA FDD cell as given in tables A.4.2.5.1-1 and A.4.2.5.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.5.1-1: General test parameters for TDD-FDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | | | 1 | One TDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | | | 2 | One FDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.5.1-2: Cell specific test parameters for TDD-FDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 FDD | | |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | 0 | | | 0 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.5.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

# A.4.2.6 E-UTRAN TDD – TDD: Inter frequency case

## A.4.2.6.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.6.1-1 and A.4.2.6.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.6.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | | | 3 μs | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.6.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $Treselection_{EUTRAN}$ | S | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.6.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.7 E-UTRAN FDD – FDD Inter frequency case in the existence of non-allowed CSG cell

### A.4.2.7.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements specified in clause 4.2.2.4 when there is the interference from non-allowed CSG cell and the layers have equal priority.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers and 1 non-allowed E-UTRA FDD CSG cell as given in tables A.4.2.7.1-1 and A.4.2.7.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 3 is a non-allowed CSG cell. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.7.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case with non-allowed CSG cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | UE shall be forced to cell 1 in the initialisation phase |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that the non-allowed CSG cell is identified. |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that whether cell re-selection would not occur is insured. |

**Table A.4.2.7.1-2: Cell specific test parameters for FDD-FDD inter frequency cell re-selection test case with non-allowed CSG cell**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3(Non-allowed CSG cell) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2_FDD) | | OP.2 FDD | | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | | -140 | | |
| Qqualmin | dB | -20 | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | |
| RSRP Note 3 | dBm/15 kHz | -90 | -90 | -85 | -Infinity | -85 | -90 | -90 | -85 | -60 |
| RSRQ Note 3 | dB | -14.1 | -17.1 | -35.8 | | | | -14.1 | -12.1 | -10.8 |
| $\hat{E}_s/I_{ot}$ | dB | -0.64 | -5.21 | -25 | -Infinity | 13 | 8 | -0.64 | 4.36 | 24.8 |
| $\hat{E}_s/N_{oc}$ | dB | 8 | 8 | 13 | -Infinity | 13 | 8 | 8 | 13 | 38 |
| Treselection | s | 0 | | | 0 | | | 0 | | |

| | | | | |
|---|---|---|---|---|
| Snonintrasearch | dB | -10 | Not sent | Not sent |
| Propagation Condition | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | |
| Note 3: RSRP and RSRQ levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

### A.4.2.7.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

The probability of reselection from Cell 2 to Cell 1 during T3 observed during testing shall be less than 10%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Inter} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell in the test case.

## A.4.2.8 E-UTRAN TDD – TDD Inter frequency case in the existence of non-allowed CSG cell

### A.4.2.8.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements specified in clause 4.2.2.4 when there is the interference from non-allowed CSG cell and the layers have equal priority.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers and 1 non-allowed E-UTRA TDD CSG cell as given in tables A.4.2.8.1-1 and A.4.2.8.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 3 is a non-allowed CSG cell. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.8.1-1: General test parameters for TDD-TDD inter frequency cell re-selection test case with non-allowed CSG cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | UE shall be forced to cell 1 in the initialisation phase |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | | μs | 3 | Synchronous cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |

| | | | |
|---|---|---|---|
| DRX cycle length | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | s | 15 | T1 need to be defined so that the non-allowed CSG cell is identified. |
| T2 | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 15 | T3 need to be defined so that whether cell re-selection would not occur is insured. |

**Table A.4.2.8.1-2: Cell specific test parameters for TDD-TDD inter frequency cell re-selection test case with non-allowed CSG cell**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 (Non-allowed CSG cell) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | | -140 | | |
| Qqualmin | dB | -20 | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15kHz | -98 | | | | | | | | |
| RSRP Note 3 | dBm/ 15kHz | -90 | -90 | -85 | -Infinity | -85 | -90 | -90 | -85 | -60 |
| RSRQ Note 3 | dB | -14.1 | -17.1 | -35.8 | | | | -14.1 | -12.1 | -10.8 |
| $\hat{E}_s / I_{ot}$ | dB | -0.64 | -5.21 | -25 | -Infinity | 13 | 8 | -0.64 | 4.36 | 24.8 |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 13 | -Infinity | 13 | 8 | 8 | 13 | 38 |
| Treselection | S | 0 | | | 0 | | | 0 | | |
| Snonintrasearch | dB | -10 | | | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and RSRQ levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.8.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

The probability of reselection from Cell 2 to Cell 1 during T3 observed during testing shall be less than 10%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Inter} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell in the test case.

## A.4.2.9 E-UTRAN FDD – FDD Intra frequency case for 5MHz bandwidth

### A.4.2.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.4.2.1.1.

The parameters of this test are the same as defined in Subclause A.4.2.1.1 except that the values of the parameters in the Table A.4.2.9.1-1 will replace the values of the corresponding parameters in A.4.2.1.1-1, and the values of the parameters in the Table A.4.2.9.1-2 will replace the values of the corresponding parameters in A.4.2.1.1-2.

**Table A.4.2.9.1-1: General test parameters for FDD intra frequency cell reselection test case for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Note 1: See Table A.4.2.1.1-1 for the other parameters.<br>Note 2: This is according to the principle defined in section A.3.7.2. | | | |

**Table A.4.2.9.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN for 5MHz**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.16 (OP.16 FDD) | | OP.16 FDD | | | OP.16 FDD | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: See Table A.4.2.1.1-2 for the other parameters. | | | | | | | |

### A.4.2.9.2 Test Requirements

The test requirements defined in section A.4.2.1.2 shall apply to this test case.

## A.4.2.10 E-UTRAN FDD – FDD reselection using an increased number of carriers

### A.4.2.10.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 E-UTRA FDD interfrequency cells on 8 different carriers in the neighbour list of cell 1 as given in tables A.4.2.10.1-1 and A.4.2.10.1-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2, 3 and 4

which are chosen from the 8 intefrequency layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2, 3 and 4 shall include the frequency of cell 1 in the normal performance group as well as the other frequencies configured to the UE in the test.

Cell 1, 2, 3 and 4 are identified by the UE during time phase T0. Cell 1, cell 2, cell 3 and cell 4 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2, 3 or 4. Cells 1, 2, 3 and 4 all have equal absolute priority.

**Table A.4.2.10.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3, 4 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell 1, cell 3, cell 4 | |
| T2 end condition | Active cell | | Cell 3 | UE shall perform reselection to cell 3 during T2 |
| | Neighbour cell | | Cell 1, cell 2, cell 4 | |
| T3 end condition | Active cell | | Cell 4 | UE shall perform reselection to cell 4 during T3 |
| | Neighbour cell | | Cell 1, cell 2, cell 3 | |
| T4 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T4 |
| | Neighbour cell | | Cell 2, cell 3, cell 4 | |
| UE configured E-UTRA RF Channel Number | | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight xDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test eqipment configuration | | | Cell 1 uses UTRA RF channel number 1 Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 | |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 25 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 200 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 200 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.2.10.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | Cell 3 | | | | | Cell 4 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | | | | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | | 5MHz: $N_{RB}$= 25<br>10MHz: $N_{RB,}$ = 50 | | | | |
| OCNG patterns | | OP.16 FDD (5MHz)<br>OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)<br>OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)<br>OP.2 FDD (10MHz) | | | | | OP.16 FDD (5MHz)<br>OP.2 FDD (10MHz) | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | -140 | | | | | -140 | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | -98 | | | | | -98 | | | | | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| RSRP Note 3 | dBm/15 kHz | -84 | -90 | -90 | -90 | -84 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 |
| $Treselection_{EUTRAN}$ | s | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | | 62 | | | | | 62 | | | | | 62 | | | | |
| Propagation Condition | | AWGN | | | | | AWGN | | | | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | |
| Timing offset to Cell 1 | | - | | | | | 3ms | | | | | 3ms | | | | | 3ms | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.10.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.2.10.2-1.

**Table A.4.2.10.2-1 : Reselection delay requirements**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T1 | Cell 2 (normal performance group) | 20.5 |
| T2 | Cell 3 (reduced performance group) | 193.3 |
| T3 | Cell 4 (reduced performance group) | 193.3 |
| T4 | Cell 1 (normal performance group) | 20.5 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: $K_{carrier,normal}$ * $T_{evaluate,E\text{-}UTRAN_Inter}$, + $T_{SI}$ , and to a reduced performance group cell can be expressed as: 6* $K_{carrier,reduced}$ * $T_{evaluate,E\text{-}UTRAN_Inter}$, + $T_{SI}$,

This gives a total of 20.48 s for normal performance group reselection and 193.28 s for reduced performance group reselection, allow 20.5 s for normal performance group and 193.3 s for reduced performance group in the test case. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved.

## A.4.2.11 E-UTRAN TDD – TDD reselection using an increased number of carriers

### A.4.2.11.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 E-UTRA TDD interfrequency cells on 8 different carriers in the neighbour list of cell 1 as given in tables A.4.2.11.1-1 and A.4.2.11.1-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2, 3 and 4 which are chosen from the 8 intefrequency layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2, 3 and 4 shall include the frequency of cell 1 in the normal performance group as well as the other frequencies configured to the UE in the test.

Cell 1, 2, 3 and 4 are identified by the UE during time phase T0. Cell 1, cell 2, cell 3 and cell 4 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2, 3 or 4. Cells 1, 2, 3 and 4 all have equal absolute priority.

**Table A.4.2.11.1-1: General test parameters for TDD-TDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2,3,4 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell 1, cell 3, cell 4 | |
| T2 end condition | Active cell | | Cell 3 | UE shall perform reselection to cell 3 during T2 |

| | | | | |
|---|---|---|---|---|
| | Neighbour cell | | Cell 1, cell 2, cell 4 | |
| T3 end condition | Active cell | | Cell4 | UE shall perform reselection to cell 4 during T3 |
| | Neighbour cell | | Cell 1, cell 2, cell 3 | |
| T4 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T4 |
| | Neighbour cell | | Cell 2, cell 3, cell 4 | |
| UE configured E-UTRA RF Channel Number | | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight xDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test eqipment configuration | | | Cell 1 uses UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 | |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 25 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 200 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 200 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.2.11.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | | Cell 3 | | | | | Cell 4 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group | | | | | Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | | | | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | | 5MHz: $N_{RB}$= 25<br>10MHz: $N_{RB,}$ = 50 | | | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | | | -140 | | | | | -140 | | | | | -140 | | | | |
| $N_{oc}$ Note 2 | dBm15 kHz | -98 | | | | | -98 | | | | | -98 | | | | | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 8 | 8 | 8 | 14 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 | 8 | 8 | 8 | 8 | 14 | 8 |
| RSRP Note 3 | dBm/15 kHz | -84 | -90 | -90 | -90 | -84 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 | -90 | -90 | -90 | -90 | -84 | -90 |
| $Treselection_{EUTRAN}$ | s | 0 | | | | | 0 | | | | | 0 | | | | | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | | 62 | | | | | 62 | | | | | 62 | | | | |
| Propagation Condition | | AWGN | | | | | AWGN | | | | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | | 1x2 | | | | |
| Timing offset to Cell 1 | | - | | | | | 3ms | | | | | 3ms | | | | | 3ms | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.11.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.2.11.2-1

**Table A.4.2.11.2-1 : Reselection delay requirements**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T1 | Cell 2 (normal performance group) | 20.5 |
| T2 | Cell 3 (reduced performance group) | 193.3 |
| T3 | Cell 4 (reduced performance group) | 193.3 |
| T4 | Cell 1 (normal performance group) | 20.5 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: $K_{carrier,normal}$ * $T_{evaluate,E\text{-}UTRAN_Inter}$, + $T_{SI}$ , and to a reduced performance group cell can be expressed as: 6* $K_{carrier,reduced}$ * $T_{evaluate,E\text{-}UTRAN_Inter}$, + $T_{SI}$,

This gives a total of 20.48 s for normal performance group reselection and 193.28 s for reduced performance group reselection, allow 20.5 s for normal performance group and 193.3 s for reduced performance group in the test case. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved.

## A.4.2.12 E-UTRAN FDD – FDD Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.12.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.12.1-1 and A.4.2.12.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.12.1-1: General test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |

| | | | |
|---|---|---|---|
| T2 | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.12.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.12.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.13 E-UTRAN HD – FDD Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.13.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.13.1-1 and A.4.2.13.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.13.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.13.1-2: Cell specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.13.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.14 E-UTRAN TDD – TDD Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.14.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.14.1-1 and A.4.2.14.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.14.1-1: General test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.14.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE in AWGN in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.14.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_\ intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,EUTRAN_\ intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.15 E-UTRAN FDD – FDD Intra frequency case for Cat-M1 UE in enhanced coverage

## A.4.2.15.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.15.1-1 and A.4.2.15.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.15.1-1: General test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.15.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.15.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.16 E-UTRAN HD – FDD Intra frequency case for Cat-M1 UE in enhanced coverage

## A.4.2.16.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.16.1-1 and A.4.2.16.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.16.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.16.1-2: Cell specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.16.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.17 E-UTRAN TDD – TDD Intra frequency case for Cat-M1 UE in enhanced coverage

## A.4.2.17.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.11.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.17.1-1 and A.4.2.17.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.17.1-1: General test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.17.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE in AWGN in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.17.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 18 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.11-1 in clause 4.2.2.11

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 17.36 s, allow 18 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.18 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage

## A.4.2.18.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.18.1-1, A.4.2.18.1-2 and A.4.2.18.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.18.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 60 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 15 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.18.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA[Note 1] | dB | | | | | | |
| NOCNG_RB[Note 1] | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.18.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.4.2.18.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.<br>Note 3: Void | | | | | | | |

## A.4.2.18.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 59.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 14.82 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}NC} + T_{SI}$,

Where:

$T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 59.32 s, allow 60 s for the cell re-selection delay to a newly detectable cell and 14.82 s, allow 15s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.19 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage

### A.4.2.19.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.19.1-1, A.4.2.19.1-2 and A.4.2.19.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.19.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |

| | | | |
|---|---|---|---|
| T2 | s | 67 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.19.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| $BW_{channel}$ | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.19.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.19.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| **Parameter** | **Unit** | **eCell 1** | | | **eCell 2** | | |
|---|---|---|---|---|---|---|---|
| | | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

Note 3: Void

### A.4.2.19.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Intra_NB\text{-}IoT\text{-}EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC} + T_{SI}$,

Where:

$T_{detect,NB_Intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12s, allow 22s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.20 E-UTRAN FDD – FDD Intra frequency case for UE Category 1bis

### A.4.2.20.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.20.1-1 and A.4.2.20.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1

and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.20.1-1: General test parameters for FDD intra frequency cell reselection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.20.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RSRP Note3 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | | | | |
| Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

### A.4.2.20.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluateFDD,intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluateFDD,intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.21 E-UTRAN TDD – TDD Intra frequency case for UE Category 1bis

### A.4.2.21.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.21.1-1 and A.4.2.21.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.21.1-1: General test parameters for TDD intra frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |

| | | | | |
|---|---|---|---|---|
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.21.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case in AWGN**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| RSRP Note3 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to Cell 1 Synchronous cells | μs | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.4.2.21.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_\ intra} + T_{SI\text{-}EUTRA}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,E\text{-}UTRAN_\ intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI\text{-}EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s, allow 8 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.22 E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

### A.4.2.22.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhancedMeasFlag* specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.22.1-1 and A.4.2.22.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. *highSpeedEnhancedMeasFlag* is broadcasted to UE. Only Cell 1 is already identified by the UE prior to the start of the test, i.e., Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.22.1-1: General test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |

| | | | | |
|---|---|---|---|---|
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤20 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.22.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | -3 | | | -3 | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN 1750Hz Note4 | | |
| Antenna Configuration | | 2x2 | | | 2x2 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz.

## A.4.2.22.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 15 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluateFDD,intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{evaluateFDD,intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.23 E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag

## A.4.2.23.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhancedMeasFlag* specified specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.23.1-1 and A.4.2.23.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. *highSpeedEnhancedMeasFlag* is broadcasted to UE. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.23.1-1: General test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤20 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.23.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with highSpeedEnhancedMeasFlag**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | |
| OCNG Pattern defined in A.3.2.2 | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 13 | 16 | -infinity | 16 | 13 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -85 | -82 | -infinity | -82 | -85 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN 1750Hz Note4 | | |
| Antenna Configuration | | 2x2 | | | 2x2 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz.

## A.4.2.23.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 15 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI-EUTRA}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E-UTRAN_\ intra} + T_{SI-EUTRA}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{evaluate,E-UTRAN_\ intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.24 HD – FDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage

### A.4.2.24.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.24.1-1, A.4.2.24.1-2 and A.4.2.24.1-3. The test consists of four successive time periods, with time duration of T0, T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.24.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | 1 | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | 5 | During T0, UE decodes SIB3-NB and SIB5-NB to acquire the inter-frequency carrier information. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. |

| | | | |
|---|---|---|---|
| T3 | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.24.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | | nCell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T0 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 180 | | | | 180 | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | eCell 1 $BW_{channel}$ 5MHz: 22<br>eCell 1 $BW_{channel}$ 10MHz: 35 | | | |
| NPBCH_RA | dB | -3 | | | | -3 | | | |
| NPBCH_RB | dB | | | | | | | | |
| NPSS_RA | dB | | | | | | | | |
| NSSS_RA | dB | | | | | | | | |
| NPDCCH_RA | dB | | | | | | | | |
| NPDCCH_RB | dB | | | | | | | | |
| NPDSCH_RA | dB | | | | | | | | |
| NPDSCH_RB | dB | | | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | | -140 | | | |
| Pcompensation | dB | 0 | | | | 0 | | | |
| $Qhyst_s$ | dB | 0 | | | | 0 | | | |
| $Qoffset_{s,n}$ | dB | 0 | | | | 0 | | | |
| Cell_selection_and_reselection_quality_measurement | | NRSRP | | | | NRSRP | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.24.1-3 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 10 | -12 | -12 | -2.7 | -infinity | -infinity | -2.7 | -12 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 10 | -12 | -12 | -2.7 | -infinity | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -88 | -110 | -110 | -100.7 | -infinity | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | | 0 | | | |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |
| Timing offset to nCell 1 | ms | 0 | | | | | | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.24.1-3: eCell 1 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | eCell 1 | | | |
|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | | |
| OCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | |
| PBCH_RA | dB | -3 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| Qrxlevmin | dBm | -140 | | | |
| Pcompensation | dB | 0 | | | |

| | | | | | |
|---|---|---|---|---|---|
| $Qhyst_s$ | dB | 0 | | | |
| $Qoffset_{s,n}$ | dB | 0 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | | | |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | | | | |

### A.4.2.24.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Inter_EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_Inter_EC} + T_{SI}$,

Where:

$T_{detect,NB_Inter_EC}$ See Table 4.6.2.6-1 in clause 4.6.2.6

$T_{evaluate,\ NB_Inter_EC}$ See Table 4.6.2.6-1 in clause 4.6.2.6

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12 s, allow 22 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.25 E-UTRAN FDD – FDD Inter frequency case for Cat-M1 UE in normal coverage

### A.4.2.25.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.25.1-1 and A.4.2.25.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.25.1-1: General test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | | | PRACH_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.25.1-2: Cell specific test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.6 | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.4.2.25.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateFDD,inter} + T_{SI}$ , and to lower priority cell can be expressed as: $T_{evaluateFDD,inter} + T_{SI}$,

Where:

$T_{higher_priority_search}$ See clause 4.7.2.1.3

$T_{evaluate,\ E\text{-}UTRAN_Inter_NC}$ See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.26 E-UTRAN HD – FDD Inter frequency case for Cat-M1 UE in normal coverage

### A.4.2.26.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.26.1-1 and A.4.2.26.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.26.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |

| | | | | |
|---|---|---|---|---|
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | | | PRACH_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.26.1-2: Cell specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.6 | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.26.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateFDD,inter} + T_{SI}$ , and to lower priority cell can be expressed as: $T_{evaluateFDD,inter} + T_{SI}$,

Where:

$T_{higher_priority_search}$ See clause 4.7.2.1.3

$T_{evaluate,\ E\text{-}UTRAN_Inter_NC}$ See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.27 E-UTRAN TDD – FDD Inter frequency case for Cat-M1 UE in normal coverage

### A.4.2.27.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.7.2.1.3.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.27.1-1 and A.4.2.27.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.27.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| PRACH configuration | | | PRACH_2CE | See table in A.3.16 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |

| | | | |
|---|---|---|---|
| T1 | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.27.1-2: Cell specific test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 | -4 | -infinity | 12 |
| RSRP Note 3 | dBm/15 KHz | -84 | -84 | -84 | -102 | -infinity | -86 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | µs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.27.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateFDD,inter} + T_{SI}$ , and to lower priority cell can be expressed as: $T_{evaluateFDD,inter} + T_{SI}$,

Where:

$T_{higher_priority_search}$ See clause 4.7.2.1.3

$T_{evaluate,\ E\text{-}UTRAN_Inter_NC}$ See Table 4.7.2.1.3-1 in clause 4.7.2.1.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.28 E-UTRAN FDD – FDD Inter frequency case for Cat-M1 UE in enhanced coverage

### A.4.2.28.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.28.1-1 and A.4.2.28.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.28.1-1: General test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.28.1-2: Cell specific test parameters for FD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.28.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Inter_EC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ ,and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Inter_EC} + T_{SI_M1_EC}$,

Where:

$T_{detect,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{evaluate,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.29 E-UTRAN HD – FDD Inter frequency case for Cat-M1 UE in enhanced coverage

## A.4.2.29.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.29.1-1 and A.4.2.29.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.29.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.29.1-2: Cell specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | | |
| PBCH_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RB | dB | -3 | | | -3 | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.29.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Inter_EC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ ,and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Inter_EC} + T_{SI_M1_EC}$,

Where:

$T_{detect,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{evaluate,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.30 E-UTRAN TDD Inter frequency case for Cat-M1 UE in enhanced coverage

## A.4.2.30.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency cell reselection requirements for category M1 UE in enhanced coverage specified in clause 4.7.2.2.3.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.30.1-1 and A.4.2.30.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.30.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carrier frequencies are used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.30.1-2: Cell specific test parameters for TDD-TDD inter frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | |
| OCNG Patterns defined in A.3.2.1.6 | | OP.2 TDD for 10 MHz cell BW:<br>OP.10 TDD for 5 MHz cell BW | | | OP.2 TDD for 10 MHz cell BW:<br>OP.10 TDD for 5 MHz cell BW | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -5 | -12 | -5 | -infinity | -5 | -12 |
| RSRP Note 3 | dBm/15 KHz | -103 | -110 | -103 | -infinity | -103 | -110 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.30.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 337 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 17 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Inter_EC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ ,and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Inter_EC} + T_{SI_M1_EC}$,

Where:

$T_{detect,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{evaluate,EUTRAN_Inter_EC}$ See Table 4.7.2.2.3-1 in clause 4.7.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}EC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 336.64 s, allow 337 s for the cell re-selection delay to a newly detectable cell and 16.64 s, allow 17 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.31 E-UTRAN FDD – FDD Inter frequency case for UE Category 1bis

### A.4.2.31.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency cell reselection requirements for UE category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA FDD cells on 2 different carriers as given in tables A.4.2.31.1-1 and A.4.2.31.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different

tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.31.1-1: General test parameters for FDD-FDD inter frequency cell re-selection test case for UE Category 1bis**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carrier frequencies are used. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.31.1-2: Cell specific test parameters for FDD-FDD inter-frequency cell reselection test case in AWGN for UE Category 1bis**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98.5 | | | -98.5 | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | -102.5 | -infinity | -85.5 |
| $\hat{E}_s / I_{ot}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $\hat{E}_s / N_{oc}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |

| | | | |
|---|---|---|---|
| $Thresh_{x, low}$ | dB | 50 | 50 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | |
| Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

### A.4.2.31.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateFDD,inter} + T_{SI}$ , and to lower priority cell can be expressed as: $T_{evaluateFDD,inter} + T_{SI}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluateFDD,inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.32 E-UTRAN FDD – TDD Inter frequency case for UE Category 1bis

### A.4.2.32.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA FDD cell and 1 E-UTRA TDD cell as given in tables A.4.2.32.1-1 and A.4.2.32.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.32.1-1: General test parameters for FDD-TDD inter frequency cell re-selection test case for UE Category 1bis**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |

| | | | | |
|---|---|---|---|---|
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | | | 1 | One FDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | | | 2 | One TDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.32.1-2: Cell specific test parameters for FDD-TDD inter-frequency cell reselection test case in AWGN for UE Category 1bis**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) | | OP.2 FDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98.5 | | | -98.5 | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | -102.5 | -infinity | -85.5 |
| $\hat{E}_s / I_{ot}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $\hat{E}_s / N_{oc}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |

| | | | |
|---|---|---|---|
| $Thresh_{x, low}$ | dB | 50 | 50 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.4.2.32.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.33 E-UTRAN TDD – FDD Inter frequency case for UE Category 1bis

### A.4.2.33.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 1 E-UTRA TDD cell and 1 E-UTRA FDD cell as given in tables A.4.2.33.1-1 and A.4.2.33.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.33.1-1: General test parameters for TDD-FDD inter frequency cell re-selection test case for UE Category 1bis**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |

| | | | | |
|---|---|---|---|---|
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| Cell 1 E-UTRA RF Channel Number | | | 1 | One TDD carrier frequency is used. And Cell 1 is on RF channel number 1. |
| Cell 2 E-UTRA RF Channel Number | | | 2 | One FDD carrier frequencies is used. And Cell 2 is on RF channel number 2. |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.33.1-2: Cell specific test parameters for TDD-FDD inter-frequency cell reselection test case in AWGN for UE Category 1bis**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) and A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98.5 | | | -98.5 | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | -102.5 | -infinity | -85.5 |
| $\hat{E}_s / I_{ot}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $\hat{E}_s / N_{oc}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $Treselection_{EUTRAN}$ | s | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |

| | | | |
|---|---|---|---|
| $Thresh_{x, low}$ | dB | 50 | 50 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | |
| Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

### A.4.2.33.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.34 E-UTRAN TDD – TDD: Inter frequency case for UE Category 1bis

### A.4.2.34.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency cell reselection requirements for UE Category 1bis specified in clause 4.2.2.4.

The test scenario comprises of 2 E-UTRA TDD cells on 2 different carriers as given in tables A.4.2.34.1-1 and A.4.2.34.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T2 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.34.1-1: General test parameters for TDD-TDD inter frequency cell reselection test case for UE Category 1bis**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell2 | UE shall be forced to cell 2 in the initialisation phase, so that reselection to cell 1 occurs during the first T1 phase |

| | | | | |
|---|---|---|---|---|
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 |
| | Neighbour cell | | Cell2 | |
| Final condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carrier frequencies are used. |
| Time offset between cells | | | 3 μs | Synchronous cells |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 15 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | >7 | During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3. |
| T3 | | s | 75 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.34.1-2: Cell specific test parameters for TDD-TDD inter-frequency cell reselection test case in AWGN for UE Category 1bis**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Pattern defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98.5 | | | -98.5 | | |
| RSRP Note 3 | dBm/15 KHz | -83.5 | -83.5 | -83.5 | -102.5 | -infinity | -85.5 |
| $\hat{E}_s / I_{ot}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $\hat{E}_s / N_{oc}$ | dB | 15 | 15 | 15 | -4 | -infinity | 13 |
| $Treselection_{EUTRAN}$ | S | 0 | | | 0 | | |
| Snonintrasearch | dB | 50 | | | Not sent | | |
| $Thresh_{x, high}$ | dB | 48 | | | 48 | | |
| $Thresh_{serving, low}$ | dB | 44 | | | 44 | | |
| $Thresh_{x, low}$ | dB | 50 | | | 50 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.4.2.34.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to higher priority shall be less than 68 s.

The cell reselection delay to lower priority is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to lower priority shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$ , and to lower priority cell can be expressed as: $T_{evaluate,E-UTRAN_inter} + T_{SI-EUTRA}$,

Where:

$T_{higher_priority_search}$ See clause 4.2.2

$T_{evaluate,E-UTRAN_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

$T_{SI-EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s for higher priority cell search and 7.68 s for lower priority cell search, allow 68 s for higher priority cell and 8 s for lower priority cell in the test case.

## A.4.2.35 E-UTRAN TDD - TDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage

### A.4.2.35.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.35.1-1, A.4.2.35.1-2 and A.4.2.35.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.35.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| | Active cell | | nCell2 | |

| | | | | |
|---|---|---|---|---|
| T2 end condition | Neighbour cells | | eCell1, eCell2, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | As specified in A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 60 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 15 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.35.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | eCell 2 $BW_{channel}$ 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.35.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | µs | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.35.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 10MHz: NOP.1 TDD | | | $BW_{channel}$ 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | µs | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

## A.4.2.35.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 59.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 14.82 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}NC} + T_{SI}$,

Where:

$T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 59.32 s, allow 60 s for the cell re-selection delay to a newly detectable cell and 14.82 s, allow 15 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.36 E-UTRAN TDD – TDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage

## A.4.2.36.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.36.1-1, A.4.2.36.1-2 and A.4.2.36.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.36.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.36.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | eCell 2 $BW_{channel}$ 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| | dBm/15 kHz | Specified in Table A.4.2.36.1-3 | | | | | |
| | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.4.2.36.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD | | | $BW_{channel}$ 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power . | | | | | | | |

## A.4.2.36.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Intra_NB\text{-}IoT\text{-}EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC} + T_{SI}$,

Where:

$T_{detect,NB_Intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12s, allow 22s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.37 E-UTRAN TDD – TDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage

### A.4.2.37.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.37.1-1, A.4.2.37.1-2 and A.4.2.37.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.37.1-1: General test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | Refer to A.3.18 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 67 | T2 is defined so that cell re-selection time is taken into account. |

| | | | |
|---|---|---|---|
| T3 | s | 22 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.37.1-2: nCell 1, nCell 2 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | **T1** | **T2** | **T3** | **T1** | **T2** | **T3** |
| $BW_{channel}$ | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | eCell 1 $BW_{channel}$ 10MHz: 35 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| | dBm/15 kHz | Specified in Table A.4.2.37.1-3 | | | | | |
| | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| Note2 | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -110 | -110 | -100.7 | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | 0 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | 0 | | | | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.37.1-3: eCell 1 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | eCell 1 | | |
|---|---|---|---|---|
| | | **T1** | **T2** | **T3** |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| Qrxlevmin | dBm | -140 | | |
| Pcompensation | dB | 0 | | |
| $Qhyst_s$ | dB | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | |
| | dBm/15 kHz | -98 | | |
| | dB | 3 | 3 | 3 |

| | | |
|---|---|---|
| Treselection | s | 0 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power . | | |

### A.4.2.37.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 66.32 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,NB_Inter_EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,\ NB_Inter_EC} + T_{SI}$,

Where:

$T_{detect,NB_Inter_EC}$ See Table 4.6.2.6-1 in clause 4.6.2.6

$T_{evaluate,\ NB_Inter_EC}$ See Table 4.6.2.6-1 in clause 4.6.2.6

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 66.32 s, allow 67 s for the cell re-selection delay to a newly detectable cell and 21.12 s, allow 22 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.38 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with serving cell RRM measurement relaxation

### A.4.2.38.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.1A when UE is configured to monitor WUS according to Table A.4.2.38.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.6.2.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two eCells of different cell ID and one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.4.2.38.1-1, A.4.2.38.1-2 and A.4.2.38.1-3. The test consists of two successive time periods, with time duration of T1 and T2, respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2.

**Table A.4.2.38.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |

| | | | | |
|---|---|---|---|---|
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| T2 end condition | Active cell | | nCell2 | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | |
| Final condition | Visited cell | | nCell1 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | Refer to A.3.18 |
| $S_{SearchDeltaP}$ | | dB | 6 | Threshold for relaxed monitoring criterion as specified in 5.2.4.12.1 in [1] |
| Rmax | | | [128] | |
| maxDurationFactor | | | [one4th] | WUS config. Wmax = 32 (=1/4*Rmax) |
| numPOs | | | [n1] | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | | | [ms40] | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | | | [4] | Serving cell RRM measurement is relaxed by |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >[30] | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | [70] | T2 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.38.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | nCell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | kHz | 180 | | 180 | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 18<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | eCell 2 $BW_{channel}$ 5MHz: 18<br>eCell 2 $BW_{channel}$ 10MHz: 30 | |
| NPBCH_RA | dB | -3 | | -3 | |
| NPBCH_RB | dB | | | | |
| NPSS_RA | dB | | | | |
| NSSS_RA | dB | | | | |
| NPDCCH_RA | dB | | | | |
| NPDCCH_RB | dB | | | | |
| NPDSCH_RA | dB | | | | |
| NPDSCH_RB | dB | | | | |
| NOCNG_RA Note 1 | dB | | | | |
| NOCNG_RB Note 1 | dB | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | NRSRP | | NRSRP | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.18.1-3 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 7 | -infinity | 11 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.33 | -infinity | 3.21 |
| NRSRP Note2 | dBm/15 kHz | -81 | -91 | -infinity | -87 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 2x1 | | 2x1 | |

| | | | |
|---|---|---|---|
| Timing offset to nCell 1 | ms | - | 3 |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.4.2.38.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | eCell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 or 10 | | 5 or 10 | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 2x1 | | 2x1 | |
| Timing offset to eCell 1 | ms | - | | 3 | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | | | | |
| Note 3: Void | | | | | |

## A.4.2.38.2 Test Requirements

Before the beginning of T2, UE is under relaxed monitoring where the serving cell measurement is performed every 5.12 s and the infra-frequency measurement for the neighbor cells is relaxed according to subclause 5.2.4.12.0 in TS 36.304 [1].

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than [69.56] s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{evaluate,\ serv_NB\text{-}NC} + T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC} + T_{SI}$.

Where:

$T_{detect,NB_Intra_NB\text{-}IoT\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2, based on the configured DRX cycle

$T_{evaluate,\ serv_NB\text{-}NC}$ See Table 4.6.2.2-1 in clause 4.6.2.2, based on the effective DRX cycle after relaxation; [10.24] s is assumed in this test case.

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of [69.56] s, allow [70] s for the cell re-selection delay to a newly detectable in the test case.

## A.4.2.39 E-UTRAN FDD – FDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16*

### A.4.2.39.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhMeasFlag2-r16* specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.39.1-1 and A.4.2.39.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. *highSpeedEnhMeasFlag2-r16* is broadcasted to UE. Only Cell 1 is already identified by the UE prior to the start of the test, i.e., Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.39.1-1: General test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤15 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.39.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.1 | | 5 MHz: OP.16 FDD<br>10 MHz: OP.2 FDD<br>20 MHz: OP.12 FDD | | | 5 MHz: OP.16 FDD<br>10 MHz: OP.2 FDD<br>20 MHz: OP.12 FDD | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | -3 | | | -3 | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN 1944 Hz Note4 | | |
| Antenna Configuration | | 2x2 | | | 2x2 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.

## A.4.2.39.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 11 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluateFDD,intra} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{evaluateFDD,intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.40 E-UTRAN TDD – TDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16*

## A.4.2.40.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency cell reselection requirements for UE configured with *highSpeedEnhMeasFlag2-r16* specified specified in clause 4.2.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.40.1-1 and A.4.2.40.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. *highSpeedEnhMeasFlag2-r16* is broadcasted to UE. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.40.1-1: General test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 [16] |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤15 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | ≤8 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.40.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra frequency case for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.2 | | 5 MHz: OP.10 TDD<br>10 MHz: OP.2 TDD<br>20 MHz: OP.8 FDD | | | 5 MHz: OP.10 TDD<br>10 MHz: OP.2 TDD<br>20 MHz: OP.8 FDD | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | -3 | | | -3 | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| $Qhyst_s$ | dB | 0 | | | 0 | | |
| $Qoffset_{s,n}$ | dB | 0 | | | 0 | | |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | | | 0 | | |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN 1944 Hz Note4 | | |
| Antenna Configuration | | 2x2 | | | 2x2 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.

### A.4.2.40.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 11 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_intra} + T_{SI\text{-}EUTRA}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{evaluate,E\text{-}UTRAN_intra}$ See Table 4.2.2.3-3 in clause 4.2.2.3

$T_{SI\text{-}EUTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 14.08 s, allow 15 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.41 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with UE specific DRX

### A.4.2.41.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.41.1-1, A.4.2.41.1-2 and A.4.2.41.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.41.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | | Refer to A.3.18 |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |

| | | | |
|---|---|---|---|
| T1 | s | >7 | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 35 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | s | 14 | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.41.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 BWchannel 5MHz: 17<br>eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 5MHz: 17<br>eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_<br>reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.41.1-3 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.4.2.41.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RANote 1 | dB | | | | | | |
| OCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | | | | | | |

### A.4.2.41.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1 and test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 13.44 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Intra_NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_intra_NC + TSI,

Where:

Tdetect,NB_Intra_NC See Table 4.6.2.2-1 in clause 4.6.2.2

Tevaluate, NB_intra_NC See Table 4.6.2.2-1 in clause 4.6.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 34.32 s, allow 35 s for the cell re-selection delay to a newly detectable cell and 13.44 s, allow 14s for the cell re-selection delay to an already detected cell in the test case.

A.4.2.42 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage with UE specific DRX

A.4.2.42.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.42.1-1, A.4.2.42.1-2 and A.4.2.42.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing

nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.42.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | | Refer to A.3.18 |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 35 | 38 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 19 | | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.42.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 BWchannel 5MHz: 17<br>eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 5MHz: 17<br>eCell 2 BWchannel 10MHz: 30 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.42.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.42.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BWchannel | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern | - | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RANote 1 | dB | | | | | | |
| OCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | | | | | | |

### A.4.2.42.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1.

The cell re-selection delay to a newly detectable cell shall be less than 37.32 s in test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 18.56 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Intra_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_intra_EC + TSI,

Where:

Tdetect,NB_Intra_EC See Table 4.6.2.4-1 in clause 4.6.2.4

Tevaluate, NB_intra_EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 34.32 s in test 1 and 37.32 s in test 2, allow 35 s and 38 s for the cell re-selection delay to a newly detectable cell in each test respectively and 18.56 s, allow 19 s for the cell re-selection delay to an already detected cell in the test case.

A.4.2.43 HD – FDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage with UE specific DRX

A.4.2.43.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.43.1-1, A.4.2.43.1-2 and A.4.2.43.1-3. The test consists of four successive time periods, with time duration of T0, T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.43.1-1: General test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell. |

| | | | | |
|---|---|---|---|---|
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| PRACH Configuration | | 1 | | Refer to A.3.16 |
| DRX cycle length | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T0 | s | 5 | | During T0, UE decodes SIB3-NB and SIB5-NB to acquire the inter-frequency carrier information. |
| T1 | s | >7 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 35 | 38 | T2 is defined so that cell re-selection time is taken into account. |
| T3 | s | 19 | | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.43.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | nCell 1 | | | | nCell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T0 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | | 180 | | | |
| PRB location within eCell | - | eCell 1 BWchannel 5MHz: 17<br>eCell 1 BWchannel 10MHz: 30 | | | | eCell 1 BWchannel 5MHz: 22<br>eCell 1 BWchannel 10MHz: 35 | | | |
| NPBCH_RA | dB | -3 | | | | -3 | | | |
| NPBCH_RB | dB | | | | | | | | |
| NPSS_RA | dB | | | | | | | | |
| NSSS_RA | dB | | | | | | | | |
| NPDCCH_RA | dB | | | | | | | | |
| NPDCCH_RB | dB | | | | | | | | |
| NPDSCH_RA | dB | | | | | | | | |
| NPDSCH_RB | dB | | | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | | | |
| Qrxlevmin | dBm | -140 | | | | -140 | | | |
| Pcompensation | dB | 0 | | | | 0 | | | |
| Qhysts | dB | 0 | | | | 0 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Qoffsets, n | dB | 0 | | | | 0 | | | |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | | NRSRP | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.43.1-3 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 10 | -12 | -12 | -2.7 | -infinity | -infinity | -2.7 | -12 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 10 | -12 | -12 | -2.7 | -infinity | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -88 | -110 | -110 | -100.7 | -infinity | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | | 0 | | | |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |
| Timing offset to nCell 1 | ms | 0 | | | | | | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | | | |

**Table A.4.2.43.1-3: eCell 1 specific test parameters for HD-FDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| | | eCell 1 | | | |
|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 |
| BWchannel | MHz | 5 or 10 | | | |
| OCNG Pattern | - | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | | |
| PBCH_RA | dB | -3 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RANote 1 | dB | | | | |
| OCNG_RBNote 1 | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Qrxlevmin | dBm | -140 | | | |
| Pcompensation | dB | 0 | | | |
| Qhysts | dB | 0 | | | |
| Qoffsets, n | dB | 0 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | | | |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | | | | |

### A.4.2.43.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1.

The cell re-selection delay to a newly detectable cell shall be less than 37.32 s in test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 18.56 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Inter_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_Inter_EC + TSI,

Where:

Tdetect,NB_Inter_EC See Table 4.6.2.6-1 in clause 4.6.2.6

Tevaluate, NB_Inter_EC See Table 4.6.2.6-1 in clause 4.6.2.6

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 34.32 s in test 1 and 37.32 in test 2, allow 35 s and 38 s for the cell re-selection delay to a newly detectable cell in each test respectively and 18.56 s, allow 19 s for the cell re-selection delay to an already detected cell in the test case.

A.4.2.44 E-UTRAN TDD - TDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with UE specific DRX

A.4.2.44.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two ecells of different cell ID and one NB-IoT carrier with 2 ncells of different physical cell ID, as given in tables A.4.2.44.1-1, A.4.2.44.1-2 and A.4.2.44.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.44.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | | As specified in A.3.18 |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 35 | | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 14 | | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.44.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.44.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 13 | 17 | -infinity | 17 | 13 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.09 | 3.79 | -infinity | 3.79 | -4.09 |
| NRSRP Note2 | dBm/15 kHz | -81 | -85 | -81 | -infinity | -81 | -85 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | μs | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.44.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | | 10 | | |
| NOCNG Pattern defined in clause D.3 | - | BWchannel 10MHz: NOP.1 TDD | | | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RANote 1 | dB | | | | | | |
| OCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | µs | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.4.2.44.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1 and test 2.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 13.44 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Intra_NC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_intra_NC + TSI,

Where:

Tdetect,NB_Intra_NC See Table 4.6.2.2-1 in clause 4.6.2.2

Tevaluate, NB_intra_NC See Table 4.6.2.2-1 in clause 4.6.2.2

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 34.32 s, allow 35 s for the cell re-selection delay to a newly detectable cell and 13.44 s, allow 14 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.45 E-UTRAN TDD – TDD Intra frequency case for UE Category NB1 In-Band mode in enhanced coverage with UE specific DRX

### A.4.2.45.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.4.

The test scenario comprises of 1 E-UTRA carrier and a total of 4 cells as given in tables A.4.2.45.1-1, A.4.2.45.1-2 and A.4.2.45.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.45.1-1: General test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |

| | | | | | |
|---|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | | Refer to A.3.18 |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 35 | 38 | T2 is defined so that cell re-selection time is taken into account. Once the UE has reselected to nCell2 (within T2) T3 starts |
| T3 | | s | 19 | | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.45.1-2: nCell 1, nCell 2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 BWchannel 10MHz: 30 | | | eCell 2 BWchannel 10MHz: 30 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -156 | -156 | -156 | -156 | -156 | -156 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.45.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -9 | -9 | -0.7 | -infinity | -0.7 | -9 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | -9 | -11.67 | -1.21 | -infinity | -1.21 | -11.67 |
| NRSRP Note2 | dBm/15 kHz | -107 | -107 | -98.7 | -infinity | -98.7 | -107 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.45.1-3: eCell 1 and eCell2 specific test parameters for TDD intra frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | BWchannel 10MHz: NOP.1 TDD | | | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RANote 1 | dB | | | | | | |
| OCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br><br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power . | | | | | | | |

### A.4.2.45.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1.

The cell re-selection delay to a newly detectable cell shall be less than 37.32 s in test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 21.12 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Intra_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_intra_EC + TSI,

Where:

Tdetect,NB_Intra_EC See Table 4.6.2.4-1 in clause 4.6.2.4

Tevaluate, NB_intra_EC See Table 4.6.2.4-1 in clause 4.6.2.4

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32s is assumed in this test case.

This gives a total of 34.32 s in test 1 and 37.32 s in test 2, allow 35 s and 38 s for the cell re-selection delay to a newly detectable cell in each test respectively and 18.56 s, allow 19 s for the cell re-selection delay to an already detected cell in the test case.

A.4.2.46 E-UTRAN TDD – TDD Inter frequency case for UE Category NB1 In-Band mode in enhanced coverage with UE specific DRX

A.4.2.46.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.6.

The test scenario comprises of 1 E-UTRA carrier and a total of 3 cells as given in tables A.4.2.46.1-1, A.4.2.46.1-2 and A.4.2.46.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.46.1-1: General test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | | Refer to A.3.18 |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |

| | | | | |
|---|---|---|---|---|
| T1 | s | >7 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 35 | 38 | T2 is defined so that cell re-selection time is taken into account. |
| T3 | s | 19 | | T3 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.46.1-2: nCell 1, nCell 2 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| BWchannel | kHz | 180 | | | 180 | | |
| PRB location within eCell | - | eCell 1 BWchannel 10MHz: 30 | | | eCell 1 BWchannel 10MHz: 35 | | |
| NPBCH_RA | dB | -3 | | | -3 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RANote 1 | dB | | | | | | |
| NOCNG_RBNote 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | | | -140 | | |
| Pcompensation | dB | 0 | | | 0 | | |
| Qhysts | dB | 0 | | | 0 | | |
| Qoffsets, n | dB | 0 | | | 0 | | |
| Cell_selection_and_ reselection_quality_measurement | | NRSRP | | | NRSRP | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.46.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ Note2 | dB | -12 | -12 | -2.7 | -infinity | -2.7 | -12 |
| NRSRP Note2 | dBm/15 kHz | -110 | -110 | -100.7 | -infinity | -100.7 | -110 |
| Treselection | s | 0 | | | 0 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to nCell 1 | ms | 0 | | | | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.4.2.46.1-3: eCell 1 specific test parameters for TDD inter frequency cell reselection test case for Cat-NB1 UE in enhanced coverage**

| Parameter | Unit | eCell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| BWchannel | MHz | 10 | | |
| OCNG Pattern | - | BWchannel 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RANote 1 | dB | | | |
| OCNG_RBNote 1 | dB | | | |
| Qrxlevmin | dBm | -140 | | |
| Pcompensation | dB | 0 | | |
| Qhysts | dB | 0 | | |
| Qoffsets, n | dB | 0 | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s/N_{oc}$ | dB | 3 | 3 | 3 |
| Treselection | s | 0 | | |

| | | |
|---|---|---|
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br><br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power . | | |

### A.4.2.46.2 Test Requirements

In each test, the cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34.32 s in test 1.

The cell re-selection delay to a newly detectable cell shall be less than 37.32 s in test 2.

In each test, the cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on nCell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 1.

The cell re-selection delay to an already detected cell shall be less than 18.56 s in test 1 and test 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tdetect,NB_Inter_EC + TSI, and to an already detected cell can be expressed as: Tevaluate, NB_Inter_EC + TSI,

Where:

Tdetect,NB_Inter_EC See Table 4.6.2.6-1 in clause 4.6.2.6

Tevaluate, NB_Inter_EC See Table 4.6.2.6-1 in clause 4.6.2.6

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 34.32 s in test 1 and 37.32 s in test 2, allow 35 s and 38 s for the cell re-selection delay to a newly detectable cell in each test respectively and 18.56 s, allow 19 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.47 HD – FDD Intra frequency case for UE Category NB1 In-Band mode in normal coverage with serving cell RRM measurement relaxation with UE specific DRX

### A.4.2.47.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-NB1 UE specified in clause 4.6.2.1A when UE is configured to monitor WUS according to Table A.4.2.47.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.6.2.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.6.2.2.

The test scenario comprises of 1 E-UTRA carrier with two eCells of different cell ID and one NB-IoT carrier with 2 nCells of different physical cell ID, as given in tables A.4.2.47.1-1, A.4.2.47.1-2 and A.4.2.47.1-3. The test consists of two successive time periods, with time duration of T1 and T2, respectively. Only nCell1 is already identified by the UE prior to the start of the test, i.e. nCell 2 is not identified. nCell 1 and nCell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing nCell 2. In Test 1, UE supports the

UE specific DRX cycle of 0.32 s and the UE shall be configured with DRX cycle of 0.32 s prior to the start of the test. In Test 2, UE supports the UE specific DRX cycle of 0.64 s and the UE shall be configured with DRX cycle of 0.64 s prior to the start of the test.

**Table A.4.2.47.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| NB-IOT operational mode | | | In-band | | |
| Initial condition | Active cell | | nCell1 | | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | | |
| T2 end condition | Active cell | | nCell2 | | |
| | Neighbour cells | | eCell1, eCell2, nCell1 | | |
| Final condition | Visited cell | | nCell1 | | |
| E-UTRA RF Channel Number | | | 1 | | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | | Refer to A.3.18 |
| SSearchDeltaP | | dB | 6 | | Threshold for relaxed monitoring criterion as specified in 5.2.4.12.1 in [1] |
| Rmax | | | 128 | | |
| maxDurationFactor | | | one4th | | WUS config. Wmax = 32 (=1/4*Rmax) |
| numPOs | | | n1 | | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | | | ms40 | | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | | | 4 | | Serving cell RRM measurement is relaxed by |
| DRX cycle length | | s | 0.32 | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >30 | | During T1, nCell2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that nCell2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 37 | 40 | T2 is defined so that cell re-selection time is taken into account. |

**Table A.4.2.47.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | nCell 1 | | nCell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| BWchannel | kHz | 180 | | 180 | |
| PRB location within eCell | - | eCell 1 BWchannel 5MHz: 18<br>eCell 1 BWchannel 10MHz: 30 | | eCell 2 BWchannel 5MHz: 18<br>eCell 2 BWchannel 10MHz: 30 | |
| NPBCH_RA | dB | -3 | | -3 | |
| NPBCH_RB | dB | | | | |
| NPSS_RA | dB | | | | |
| NSSS_RA | dB | | | | |
| NPDCCH_RA | dB | | | | |
| NPDCCH_RB | dB | | | | |
| NPDSCH_RA | dB | | | | |
| NPDSCH_RB | dB | | | | |
| NOCNG_RANote 1 | dB | | | | |
| NOCNG_RBNote 1 | dB | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 |
| Cell_selection_and_<br>reselection_quality_measurement | | NRSRP | | NRSRP | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.4.2.18.1-3 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 17 | 7 | -infinity | 11 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 17 | -4.33 | -infinity | 3.21 |
| NRSRP Note2 | dBm/15 kHz | -81 | -91 | -infinity | -87 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 2x1 | | 2x1 | |
| Timing offset to nCell 1 | ms | - | | 3 | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.2.47.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-NB1 UE in normal coverage**

| Parameter | Unit | eCell 1 | | eCell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| BWchannel | MHz | 5 or 10 | | 5 or 10 | |
| NOCNG Pattern defined in clause D.3 | - | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | | BWchannel 5MHz: NOP.4 FDD<br>BWchannel 10MHz: NOP.1 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RANote 1 | dB | | | | |
| OCNG_RBNote 1 | dB | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 |
| Qhysts | dB | 0 | 0 | 0 | 0 |
| Qoffsets, n | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 |
| Treselection | s | 0 | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 2x1 | | 2x1 | |
| Timing offset to eCell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.4.2.47.2 Test Requirements

Before the beginning of T2, UE is under relaxed monitoring where the serving cell measurement is performed every 1.28 s in test 1 and 2.56 s in test 2 and the infra-frequency measurement for the neighbor cells is relaxed according to subclause 5.2.4.12.0 in TS 36.304 [1].

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The cell re-selection delay to a newly detectable cell shall be less than 36.88 s in test 1.

The cell re-selection delay to a newly detectable cell shall be less than 39.44 s in test 2.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on nCell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on nCell 2.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: Tevaluate, serv_NB-NC + Tdetect,NB_Intra_NB-IoT-NC + TSI.

Where:

Tdetect,NB_Intra_NC See Table 4.6.2.2-1 in clause 4.6.2.2, based on the configured DRX cycle

Tevaluate, serv_NB-NC See Table 4.6.2.2-1 in clause 4.6.2.2, based on the effective DRX cycle after relaxation; 2.56 s is assumed in test 1 and 5.12 s is assumed in test 2.

TSI Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 8.32 s is assumed in this test case.

This gives a total of 36.88 s in test 1 and 39.44 s in test 2, allow 37 s and 40 s for the cell re-selection delay to a newly detectable cell in each test respectively.

## A.4.2.48 E-UTRAN FD-FDD RSS based Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.48.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in normal coverage based on RSS as specified in clause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.48.1-1 and A.4.2.48.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to ‘enabled’. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.48.1-2.

**Table A.4.2.48.1-1: General test parameters for FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.48.1-2: Cell specific test parameters for FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 1280 | | | 1280 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.48.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_NC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra_NC_RSS} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra_NC}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{evaluate,EUTRAN_Intra_NC_RSS}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.49 E-UTRAN HD-FDD RSS based Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.49.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE in normal coverage based on RSS as specified in clause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.49.1-1 and A.4.2.49.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to 'enabled'. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.49.1-2.

**Table A.4.2.49.1-1: General test parameters for HD-FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |

| | | | |
|---|---|---|---|
| T1 | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.49.1-2: Cell specific test parameters for HD-FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 1280 | | | 1280 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.49.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_NC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra_NC_RSS} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra_NC}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{evaluate,EUTRAN_Intra_NC_RSS}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.50 E-UTRAN TDD RSS based Intra frequency case for Cat-M1 UE in normal coverage

### A.4.2.50.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE based on RSS as specified in clause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.50.1-1 and A.4.2.50.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to 'enabled'. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.50.1-2.

**Table A.4.2.50.1-1: General test parameters for TDD RSS based intra frequency cell re-selection test case for Cat-M1 UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

| | | | |
|---|---|---|---|
| T3 | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.50.1-2: Cell specific test parameters for TDD RSS based intra frequency cell re-selection test case for Cat-M1 UE in AWGN in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 1280 | | | 1280 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.50.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 6 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_NC} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_\ intra_NC_RSS} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra_NC}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{evaluate,EUTRAN_\ intra_NC_RSS}$ See Table 4.7.2.1.2-1 in clause 4.7.2.1.2

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 5.12 s, allow 6 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.51 E-UTRAN FD-FDD RSS based Intra frequency case for Cat-M1 UE in enhanced coverage

### A.4.2.51.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in enhanced coverage based on RSS as specified in clause 4.7.2.2.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.51.1-1 and A.4.2.51.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to 'enabled'. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.51.1-2.

**Table A.4.2.51.1-1: General test parameters for FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |

| | | | |
|---|---|---|---|
| T1 | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.51.1-2: Cell specific test parameters for FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 640 | | | 640 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.51.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 13 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra_EC_RSS} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra_EC}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{evaluate,EUTRAN_Intra_EC_RSS}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 12.8 s, allow 13 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.52 E-UTRAN HD-FDD RSS based Intra frequency case for Cat-M1 UE in enhanced coverage

### A.4.2.52.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE in enhanced coverage based on RSS as specified in clause 4.7.2.2.2.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.52.1-1 and A.4.2.52.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to 'enabled'. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.52.1-2.

**Table A.4.2.52.1-1: General test parameters for HD-FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |

| | | | |
|---|---|---|---|
| T2 | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.52.1-2: Cell specific test parameters for HD-FDD RSS based intra frequency cell reselection test case for Cat-M1 UE in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 640 | | | 640 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.52.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 13 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra_EC_RSS} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra_EC}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{evaluate,EUTRAN_Intra_EC_RSS}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 12.8 s, allow 13 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.53 E-UTRAN TDD RSS based Intra frequency case for Cat-M1 UE in enhanced coverage

### A.4.2.53.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE in enhanced coverage based on RSS as specified in clause 4.7.2.2.2.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.53.1-1 and A.4.2.53.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

RSS measurement is enabled in both Cell 1 and Cell2 with *rss-MeasConfig* and *rss-MeasNonNCL* in SIB2 set to 'enabled'. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in SIB4. *intraFreqNeighCellList-v1610* is also absent in SIB4. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.4.2.53.1-2.

**Table A.4.2.53.1-1: General test parameters for TDD RSS based intra frequency cell re-selection test case for Cat-M1 UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Parameters | | | PRACH_4CE | Refer to A.3.16 |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | ≤340 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

| | | | |
|---|---|---|---|
| T3 | s | ≤20 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.53.1-2: Cell specific test parameters for TDD RSS based intra frequency cell re-selection test case for Cat-M1 UE in AWGN in enhanced coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_ reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -7 | -12 | -7 | -infinity | -7 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | -7 | -12.79 | -7.27 | -infinity | -7.27 | -12.79 |
| RSRP Note3 | dBm/15 kHz | -105 | -110 | -105 | -infinity | -105 | -110 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |
| RSS duration | ms | 8 | | | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the paging narrowband | | | RB index corresponding to the lowest RB of the paging narrowband | | |
| RSS perodicity | ms | 640 | | | 640 | | |
| RSS power boost | dB | 0 | | | 0 | | |
| RSS time offset | ms | Frame number corresponding to the last frame before the paging frame | | | Frame number corresponding to the last frame before the paging frame | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.53.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 338 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 13 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra_EC} + T_{SI}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra_EC_RSS} + T_{SI}$,

Where:

$T_{detect,EUTRAN_Intra_EC}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{evaluate,EUTRAN_Intra_EC_RSS}$ See Table 4.7.2.2.2-1 in clause 4.7.2.2.2

$T_{SI}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 6400 ms is assumed in this test case.

This gives a total of 337.36 s, allow 338 s for the cell re-selection delay to a newly detectable cell and 12.8 s, allow 13 s for the cell re-selection delay to an already detected cell in the test case.

## A.4.2.54 E-UTRAN FDD – FDD Intra frequency case for Cat-M1 UE in normal coverage with serving cell RRM measurement relaxation

### A.4.2.54.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency cell reselection requirements for category M1 UE in normal coverage specified in clause 4.2.2.3 when UE is configured to monitor WUS according to Table A.4.2.54.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.7.2.1.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.4.2.54.1-1 and A.4.2.54.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.54.1-1: General test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| Rmax | | | [128] | |
| maxDurationFactor | | | [one4th] | WUS config. Wmax = 32 (=1/4*Rmax) |
| numPOs | | | [n1] | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | | | [ms40] | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | | | [4] | Serving cell RRM measurement is relaxed by |

| | | | |
|---|---|---|---|
| DRX cycle length | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.54.1-2: Cell specific test parameters for FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.54.2 Test Requirements

Before the beginning of T2, UE is under relaxed monitoring where the serving cell measurement is performed every 5.12 s and the infra-frequency measurement for the neighbor cells is relaxed according to subclause 5.2.4.12.0 in TS 36.304 [1].

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 20 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 9 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3 based on the configured DRX cycle

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3 based on the effective DRX cycle after relaxation; [10.24] s is assumed in this test case.

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 19.2 s, allow 20 s for the cell re-selection delay to a newly detectable cell and 8.96 s, allow 9 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.55 E-UTRAN HD – FDD Intra frequency case for Cat-M1 UE in normal coverage with serving cell RRM measurement relaxation

## A.4.2.55.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3 when UE is configured to monitor WUS according to Table A.4.2.55.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.7.2.1.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA carrier and 2 cells as given in tables A.4.2.55.1-1 and A.4.2.55.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Only Cell 1 is already identified by the UE prior to the start of the test, i.e. Cell 2 is not identified by the UE prior to the start of the test. Cell 1 and Cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing Cell 2.

**Table A.4.2.55.1-1: General test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| Rmax | | | [128] | |
| maxDurationFactor | | | [one4th] | WUS config. Wmax = 32 (=1/4*Rmax) |
| numPOs | | | [n1] | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | | | [ms40] | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | | | [4] | Serving cell RRM measurement is relaxed by |
| DRX cycle length | | s | 0.64 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |

| | | | |
|---|---|---|---|
| T2 | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.55.1-2: Cell specific test parameters for HD-FDD intra frequency cell reselection test case for Cat-M1 UE in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.6 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.55.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 20 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on Cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 1.

The cell re-selection delay to an already detected cell shall be less than 9 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 19.2 s, allow 20 s for the cell re-selection delay to a newly detectable cell and 8.96 s, allow 9 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.2.56 E-UTRAN TDD – TDD Intra frequency case for Cat-M1 UE in normal coverage

## A.4.2.56.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency cell reselection requirements for Cat-M1 UE specified in clause 4.2.2.3 when UE is configured to monitor WUS according to Table A.4.2.56.1-1 and under the serving cell RRM measurement relaxation according to the subclause 4.7.2.1.1A and under the intra-frequency neighbor cell measurement relaxation according to the subclause 4.7.2.1.2.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.4.2.56.1-1 and A.4.2.56.1-2. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

**Table A.4.2.56.1-1: General test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | |
| | Neighbour cells | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | |
| | Neighbour cells | | Cell1 | |
| Final condition | Visited cell | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH Configuration | | | PRACH_2CE | Refer to A.3.16 |
| Rmax | | | [128] | |
| maxDurationFactor | | | [one4th] | WUS config. Wmax = 32 (=1/4*Rmax) |
| numPOs | | | [n1] | WUS config. Single PO mapped to each WUS occasion |
| timeOffsetDRX | | | [ms40] | WUS config. Gap between the end of WUS duration to the associated PO |
| numDRX-CycleRelaxed | | | [4] | Serving cell RRM measurement is relaxed by |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >7 | During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2 |
| T2 | | s | 40 | T2 need to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 15 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.2.56.1-2: Cell specific test parameters for TDD intra frequency cell re-selection test case for Cat-M1 UE in AWGN in normal coverage**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| OCNG Patterns | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | | | RSRP | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 12 | 16 | -infinity | 16 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -4.11 | 3.73 | -infinity | 3.73 | -4.11 |
| RSRP Note3 | dBm/15 kHz | -82 | -86 | -82 | -infinity | -82 | -86 |
| Treselection | s | 0 | 0 | 0 | 0 | 0 | 0 |
| Sintrasearch | dB | Not sent | | | Not sent | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | µs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4.2.56.2 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 20 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than 9 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect,EUTRAN_Intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$, and to an already detected cell can be expressed as: $T_{evaluate,\ E\text{-}UTRAN_\ intra} + T_{SI\text{-}EUTRA\text{-}M1\text{-}NC}$,

Where:

$T_{detect,EUTRAN_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{evaluate,EUTRAN_intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3

$T_{SI-EUTRA-M1-NC}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 19.2 s, allow 20 s for the cell re-selection delay to a newly detectable cell and 8.96 s, allow 9 s for the cell re-selection delay to an already detected cell in the test case.

# A.4.3 E-UTRAN to UTRAN Cell Re-Selection

## A.4.3.1 E-UTRAN FDD – UTRAN FDD:

### A.4.3.1.1 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of higher priority

#### A.4.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the UTRA cell is of higher priority.

The test scenario comprises of one E-UTRA FDD and one UTRA FDD cells as given in tables A.4.3.1.1.1-1, A.4.3.1.1.1-2 and A.4.3.1.1.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

**Table A.4.3.1.1.1-1: General test parameters for E-UTRA FDD- higher priority UTRA FDD inter RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | UE is on cell 1 in the initialisation phase, so that reselection to cell 2 occurs during T2 |
| T2 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell 1 | |
| T3 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T3 |
| | Neighbour cell | | Cell 2 | |
| E-UTRA PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | >20 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | | s | 85 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | | s | 25 | T3 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.3.1.1.1-2: Cell specific test parameters for cell 1(E-UTRA)**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | | |
| PBCH_RA | dB | | | |

| | | | | |
|---|---|---|---|---|
| PBCH_RB | dB | 0 | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| Qqualmin for UTRA neighbour cell | dB | -20 | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | | |
| Qrxlevmin | dBm | -140 | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| RSRP | dBm/15 KHz | -84 | -84 | -84 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | 14 | 14 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | 14 | 14 |
| $Treselection_{EUTRAN}$ | S | 0 | | |
| Snonintrasearch | dB | 50 | | |
| $Thresh_{x, high}$ (Note 2) | dB | 40 | | |
| Propagation Condition | | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: This refers to the value of $Thresh_{x, high}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

**Table A.4.3.1.1.1-3: Cell specific test parameters for cell 2(UTRA)**

| Parameter | Unit | Cell 2 (UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| UTRA RF Channel Number | | Channel 2 | | |
| CPICH_Ec/Ior | dB | -10 | | |
| PCCPCH_Ec/Ior | dB | -12 | | |
| SCH_Ec/Ior | dB | -12 | | |
| PICH_Ec/Ior | dB | -15 | | |
| OCNS_Ec/Ior | dB | -0.941 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Infinity | 11 | -5 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | | |
| CPICH_Ec/Io | dB | -Infinity | -10.33 | -16.19 |
| CPICH_RSCP | dBm | -Infinity | -69 | -85 |
| Propagation Condition | | AWGN | | |
| Qqualmin | dB | -20 | | |
| Qrxlevmin | dBm | -115 | | |
| QrxlevminEUTRA | dBm | -140 | | |
| UE_TXPWR_MAX_RACH | dBm | 21 | | |
| Treselection | s | 0 | | |
| Sprioritysearch1 | dB | 62 | | |
| Sprioritysearch2 | dB | 0 | | |
| $Thresh_{serving, low}$ | dB | 36 | | |
| $Thresh_{x, low}$ (Note 1) | dB | 50 | | |
| Note 1 : his refers to the value of $Thresh_{x, low}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | |

#### A.4.3.1.1.2 Test Requirements

The cell reselection delay to higher priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to higher priority shall be less than 81 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateUTRA_FDD} + T_{SI-UTRA}$

Where:

$T_{higher_priority_search}$ See clause 4.2.2; 60s is assumed in this test case

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 80.48 s for higher priority cell search, allow 81 s for higher priority cell reselection in the test case.

### A.4.3.1.2 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of lower priority

#### A.4.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority.

The test scenario comprises of one UTRA FDD and one E-UTRA FDD cells as given in tables A.4.3.1.2.1-1, A.4.3.1.2.1-2 and A.4.3.1.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

**Table A.4.3.1.2.1-1: General test parameters for EUTRA FDD- lower priority UTRA FDD inter RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell1 | |
| E-UTRA PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.3.1.2.1-2: Cell specific test parameters for cell 1 (E-UTRA)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | |

| | | | |
|---|---|---|---|
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| Qqualmin for UTRA neighbour cell | dB | -20 | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | |
| Qrxlevmin | dBm | -140 | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -86 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 12 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 12 | -4 |
| $Treselection_{EUTRAN}$ | s | 0 | |
| Snonintrasearch | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 44 | |
| $Thresh_{x, low}$ (Note 2) | dB | 42 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2 : This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | |

**Table A.4.3.1.2.1-3: Cell specific test parameters for cell 2 (UTRA)**

| Parameter | Unit | Cell 2 (UTRA) | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | Channel 2 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| OCNS_Ec/Ior | dB | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | 13 | 13 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | |
| CPICH_Ec/Io | dB | -10.21 | -10.21 |
| CPICH_RSCP | dBm | -67 | -67 |
| Propagation Condition | | AWGN | |
| Qqualmin | dB | -20 | |
| Qrxlevmin | dBm | -115 | |
| QrxlevminEUTRA | dBm | -140 | |
| UE_TXPWR_MAX_RACH | dBm | 21 | |
| Treselection | s | 0 | |
| Sprioritysearch1 | dB | 42 | |
| Sprioritysearch2 | dB | 0 | |
| $Thresh_{x, high}$ (Note 1) | dB | 48 | |

| | |
|---|---|
| Note 1 : | This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell |

### A.4.3.1.2.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_FDD} + T_{SI-UTRA}$

Where:

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

## A.4.3.1.3 EUTRA FDD-UTRA FDD cell reselection in fading propagation conditions: UTRA FDD is of lower priority

### A.4.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA FDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority, and to verify the robustness of the UE measurement filtering in a fading environment. The E-UTRA cell is in fading propagation conditions and the UTRA cell is in AWGN propagation conditions.

The test scenario comprises of one UTRA FDD and one E-UTRA FDD cells as given in tables A.4.3.1.3.1-1, A.4.3.1.3.1-2 and A.4.3.1.3.1-3. The test consists of four successive time periods, with time duration of T1 T2, T3 and T4 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

**Table A.4.3.1.3.1-1: General test parameters for EUTRA FDD- lower priority UTRA FDD inter RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | |
| T3 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| | Neighbour cell | | Cell1 | |
| E-UTRA PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | <85 | T1 need to be defined so that cell re-selection reaction time is taken into account. T1 is terminated when the UE starts to send preambles to cell 1 |
| T2 | | s | 64 | The start of T2 is defined as the time when the UE starts to send PRACH preambles to cell 1 |

| | | | |
|---|---|---|---|
| T3 | s | <25 | T3 need to be defined so that cell re-selection reaction time is taken into account. T3 is terminated when the UE starts to send preambles to cell 2 |
| T4 | s | 64 | The start of T4 is defined as the time when the UE starts to send PRACH preambles to cell 2 |

**Table A.4.3.1.3.1-2: Cell specific test parameters for cell 1 (E-UTRA)**

| Parameter | Unit | Cell 1 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | | | |
| PSS_RA | dB | 0 | | | |
| SSS_RA | dB | 0 | | | |
| PCFICH_RB | dB | 0 | | | |
| PHICH_RA | dB | 0 | | | |
| PHICH_RB | dB | 0 | | | |
| PDCCH_RA | dB | 0 | | | |
| PDCCH_RB | dB | 0 | | | |
| PDSCH_RA | dB | 0 | | | |
| PDSCH_RB | dB | 0 | | | |
| OCNG_RA Note 1 | dB | 0 | | | |
| OCNG_RB Note 1 | dB | 0 | | | |
| Qqualmin for UTRA neighbour cell | dB | -20 | | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | | | |
| Qrxlevmin | dBm | -140 | | | |
| $N_{oc}$ | dBm/15 kHz | -104 | | | |
| RSRP | dBm/15 KHz | -82 | -82 | -107 | -107 |
| $\hat{E}_s / I_{ot}$ | dB | 22 | 22 | -3 | -3 |
| $\hat{E}_s / N_{oc}$ | dB | 22 | 22 | -3 | -3 |
| $Treselection_{EUTRAN}$ | s | 0 | | | |
| Snonintrasearch | dB | Not sent | | | |
| $Thresh_{serving, low}$ | dB | 44 | | | |
| $Thresh_{x, low}$ (Note 2) | dB | 42 | | | |
| Propagation Condition | | ETU70 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell. | | | | | |

**Table A.4.3.1.3.1-3: Cell specific test parameters for cell 2 (UTRA)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number | | Channel 2 | | | |
| CPICH_Ec/Ior | dB | -10 | | | |
| PCCPCH_Ec/Ior | dB | -12 | | | |
| SCH_Ec/Ior | dB | -12 | | | |
| PICH_Ec/Ior | dB | -15 | | | |
| OCNS_Ec/Ior | dB | -0.941 | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | 13 | 13 | 13 | 13 |

| $I_{oc}$ | dBm/3,84 MHz | -70 | | | |
|---|---|---|---|---|---|
| CPICH_Ec/Io | dB | -10.21 | -10.21 | -10.21 | -10.21 |
| CPICH_RSCP | dBm | -67 | -67 | -67 | -67 |
| Propagation Condition | | AWGN | | | |
| Qqualmin | dB | -20 | | | |
| Qrxlevmin | dBm | -115 | | | |
| QrxlevminEUTRA | dBm | -140 | | | |
| UE_TXPWR_MAX_RACH | dBm | 21 | | | |
| Treselection | s | 0 | | | |
| Sprioritysearch1 | dB | 42 | | | |
| Sprioritysearch2 | dB | 0 | | | |
| $Thresh_{x, high}$ (Note 1) | dB | 44 | | | |
| Note 1 : This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | |

### A.4.3.1.3.2 Test Requirements

The probability of reselection from cell 1to cell 2 during T2 observed during testing shall be less than 10%

The probability of reselection from cell 2 to cell 1 during T4 observed during testing shall be less than 10%

The cell reselection delay to lower priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2. In order to evaluate reselection delay, the system simulator first needs to verify that the UE is camped on cell 1 at the start of T3

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_FDD} + T_{SI-UTRA}$

Where:

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

## A.4.3.1.4 EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of lower priority for 5MHz bandwidth

### A.4.3.1.4.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.4.3.1.2.1

The parameters of this test are the same as defined in Subclause A.4.3.1.2.1 except that the values of the parameters in the Table A.4.3.1.4.1-2 will replace the values of the corresponding parameters in A.4.3.1.2.1-2.

This is according to the principle defined in section A.3.7.2.

**Table A.4.3.1.4.1-2: Cell specific test parameters for cell 1 (E-UTRA) for 5MHz bandwidth**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | |
| OCNG Patterns defined in A.3.2.1.16 (OP.16 FDD) | | OP.16 FDD | |
| Note 1: See Table A.4.3.1.2.1-2 for the other parameters. | | | |

#### A.4.3.1.4.2 Test Requirements

The test requirements defined in section A.4.3.1.2.1 shall apply to this test case.

### A.4.3.1.5 Idle mode FDD to UTRA FDD interRAT reselection

#### A.4.3.1.5.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD-UTRA FDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 UTRA FDD interfrequency cells on 6 different carriers in the neighbour list of cell 1 as given in table A.4.3.1.5-1 and cells 2 and 3 as given in table A.4.3.1.5-2. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 6 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other frequencies configured to the UE in the test.

Cell 1, 2 and 3 are identified by the UE during time period T0. Cell 1, cell 2 and cell 3 all belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3. Cells 2 and 3 all have lower absolute priority than cell 1.

**Table A.4.3.1.5-1: General test parameters for E-UTRAN FDD- UTRAN FDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell 1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2 and 3, and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell 1, cell 3 | |
| T2 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T2 |
| | Neighbour cell | | Cell 2, cell 3 | |
| T3 end condition | Active cell | | Cell 3 | UE shall perform reselection to cell 3 during T3 |
| | Neighbour cell | | Cell 1, cell 2 | |
| T4 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T4 |
| | Neighbour cell | | Cell 2, cell 3 | |
| UE configured E-UTRA RF Channel Number | | | 1 | Serving cell and six UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |
| UE configured UTRA RF Channel Number | | | 2,3,4,5,6,7 | |
| Test eqipment configuration | | | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7 | |

| | | | |
|---|---|---|---|
| PRACH configuration | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | s | (test equipment frequency selection and configuration time) + 960 | Initialisation time need to be defined so that cell detection time is taken into account. |
| T1 | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | s | 350 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.3.1.5-2: Cell specific test parameters for E-UTRAN FDD- UTRAN FDD inter-RAT cell reselection test case in AWGN cell 1 (E-UTRAN)**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | |
| Io | dBm/4.5 MHz(25 RB)<br><br>dBm/9Mhz (50RB) | -59.06<br><br>-56.05 | -71.77<br><br>-68.76 | -59.06<br><br>-56.05 | -71.77<br><br>-68.76 | -59.06<br><br>-56.05 |
| PDSCH parameters: DL Reference Measurement Channel | | OP.16 FDD (5MHz)<br>OP.2 FDD (10MHz) | | | | |
| PBCH RA | dB | 0 | | | | |
| PBCH RB | dB | | | | | |
| PSS RA | dB | | | | | |
| SSS RA | dB | | | | | |
| PCFICH RB | dB | | | | | |
| PHICH RA | dB | | | | | |
| PHICH RB | dB | | | | | |
| PDCCH RA | dB | | | | | |
| PDCCH RB | dB | | | | | |
| PDSCH RA | dB | | | | | |
| PDSCH RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| Qrxlevmin | dBm | -140 | | | | |
| $N_{oc}$ Note 2 | dBm | -98 | | | | |
| RSRP Note 3 | dBm | -84 | -102 | -84 | -102 | -84 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | -4 | 14 | -4 | 14 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | -4 | 14 | -4 | 1 |
| $Treselection_{EUTRAN}$ | s | 0 | | | | |

| | | |
|---|---|---|
| Snonintrasearch | dB | 62 |
| $Thresh_{serving, low}$ | dB | 44 |
| $Thresh_{x, low}$ (Note 4) | dB | 40 |
| Propagation Condition | | AWGN |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell

**Table A.4.3.1.5-3: Cell specific test parameters for cells 2 and 3 (UTRA)**

| Parameter | Unit | Cell 2 | | | | | Cell 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number | | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | Randomly selected from 4, 5, 6 such that cell 3 is in the reduced performance group | | | | |
| CPICH_Ec/Ior | dB | -10 | | | | | -10 | | | | |
| PCCPCH_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| SCH_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| PICH_Ec/Ior | dB | -15 | | | | | -15 | | | | |
| OCNS_Ec/Ior | dB | -0.941 | | | | | 0.941 | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | +11 | +11 | +11 | -5 | +11 | +11 | -5 | +11 | +11 | +11 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | | | | | -70 | | | | |
| CPICH_Ec/Io | dB | -10.33 | -10.33 | -10.33 | -16.191 | -10.33 | -10.33 | -16.19 | -10.33 | -10.33 | -10.33 |
| CPICH_RSCP | dBm | -69 | -69 | -69 | -85 | -69 | -69 | -85 | -69 | -69 | -69 |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Qqualmin | dB | -20 | | | | | -20 | | | | |
| Qrxlevmin | dBm | -115 | | | | | -115 | | | | |
| QrxlevminEUTRA | dBm | -140 | | | | | -140 | | | | |
| UE_TXPWR_MAX_RACH | dBm | 21 | | | | | 21 | | | | |
| Treselection | s | 0 | | | | | 0 | | | | |
| Sprioritysearch1 | dB | 40 | | | | | 40 | | | | |
| Sprioritysearch2 | dB | 0 | | | | | 0 | | | | |
| $Thresh_{x,high}$ (Note 1) | dB | 50 | | | | | 50 | | | | |

Note 1: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell

### A.4.3.1.5.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.1.5.2-1

**Table A.4.3.1.5.2-1**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T0 | Cell 1 | |
| T1 | Cell 2 (normal performance group) | 59 |

| | | |
|---|---|---|
| T2 | Cell 1 (normal performance group) | 21 |
| T3 | Cell 3 (reduced performance group) | 347 |
| T4 | Cell 1 (normal performance group) | 21 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: ($N_{UTRA_carrier,normal}$) * $T_{evaluateUTRA_FDD}$ + $T_{SI-UTRA}$ and to a reduced performance group cell can be expressed as: 6 * $N_{UTRA_carrier,reduced}$ * $T_{evaluateUTRA_FDD}$ + $T_{SI-UTRA}$.

Where:

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 58.88 s for normal performance group reselection, allow 21 s, and gives a total of 346.88 s for reduced performance group reselection, allow 347 s for reduced performance group in the test case. For reselections back to cell 1 since only one frequency is configured, the requirement is $T_{evaluate,E-UTRAN}$ + $T_{SI}$ = 20.48 s, allow 21 s.

## A.4.3.2 E-UTRAN FDD – UTRAN TDD:

### A.4.3.2.1 Test Purpose and Environment

#### A.4.3.2.1.1 Void

#### A.4.3.2.1.2 1.28Mcps TDD option

This test is to verify the requirement for the E-UTRA FDD to UTRA TDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.2 when the UTRA cell is of lower priority.

This test scenario comprised of 1 E-UTRA FDD serving cell (Cell 1), and 1 UTRA TDD cell (Cell 2) to be re-selected. Test parameters are given in table A.4.3.2.1.2-1, A.4.3.2.1.2-2, and A.4.3.2.1.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Cell 2 is of lower priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

**Table A.4.3.2.1.2-1: General test parameters for E-UTRA FDD to UTRA (1.28 Mcps TDD OPTION) Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | E-UTRAN cell |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | 1.28 Mcps TDD OPTION cell |
| T2 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell1 | E-UTRA FDD cell |
| CP length of cell 1 | | | normal | |
| E-UTRA PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| Treselection | | s | 0 | |
| DRX cycle length | | s | 1,28 | |
| HCS | | | Not used | |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | |

**Table A.4.3.2.1.2-2: Cell specific test parameters for cell re-selection E-UTRA FDD to UTRA TDD test case (cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| Qrxlevmin | dBm/15kHz | -140 | -140 |
| $N_{oc}$ | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -87 | -101 |
| $\hat{E}_s / I_{ot}$ | dB | 11 | -3 |
| $S_{nonintrasearch}$ | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 46 (-94dBm) | |
| $Thresh_{x, low}$ (Note2) | dB | 24 (-79dBm) | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note2: This refers to the value of Threshx, low which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell

**Table A.4.3.2.1.2-3: Cell specific test parameters for cell re-selection E-UTRA FDD to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number (Note1) | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior | dB | -3 | -3 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | 11 | 11 | 11 | 11 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -72 | -72 | n.a. | n.a. |
| Propagation Condition | | AWGN | | | |
| Qrxlevmin | dBm | -103 | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | |
| $Qhyst1_{s}$ | dB | 0 | | | |
| $Thresh_{x, high}$ (Note2) | dB | 46 (-94dBm) | | | |

Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.

Note2: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell

#### A.4.3.2.1.3 Void

### A.4.3.2.2 Test Requirements

#### A.4.3.2.2.1 1.28Mcps TDD option

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_TDD} + T_{SI-UTRA}$

Where:

$T_{evaluateUTRA_TDD}$ 19.2s, See table table 4.2.2.5.2-1
$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s, allow 21 s for lower priority cell reselection in the test case.

#### A.4.3.2.2.2.3 Void

## A.4.3.2A E-UTRA FDD to UTRA TDD cell re-selection for IncMon

### A.4.3.2A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA FDD to UTRA TDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4. UTRA TDD cells are of lower priority than E-UTRA serving cell.

The test scenario comprises of indicating 7 UTRA TDD inter-RAT cells on 7 different carriers in the neighbour list of cell 1 as given in tables A.4.3.2A.1-1, A.4.3.2A.1-2 and A.4.3.2A.1-3. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3, and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (E-UTRA serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 7 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other UTRA TDD frequencies configured to the UE in the test.

Cell 1, 2 and 3 are identified by the UE during time phase T0. Cell 1, cell 2 and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3.

**Table A.4.3.2A.1-1: General test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell1 | |
| T2 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T2 |
| T3 end condition | Active cell | | Cell3 | UE shall perform reselection to cell 3 during T3 |
| | Neighbour cell | | Cell1 | |

| | | | | |
|---|---|---|---|---|
| T4 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 in T4 so that next repetition of test can start from T0 |
| UE configured UTRA RF Channel Number | | | 1, 2, 3, 4, 5, 6, 7 | **Seven UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 4, 5, 6, and 7 are indicated to have reduced performance** |
| Test eqipment configuration | | | Cell 1, 2, 3 | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2 is randomly selected to use different frequencies selected from UTRA frequencies 1, 2, 3.<br>Cells 3 is randomly selected to use different frequencies selected from UTRA frequencies 4, 5, 6, 7. |
| CP length of cell 1 | | | normal | |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| $T_{reselection}$ | | s | 0 | |
| HCS | | | Not used | |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | | s | 500 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.3.2A.1-2: E-UTRA Cell specific test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | | | | |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA NOTE 1 | dB | | | | | |
| OCNG_RB NOTE 1 | dB | | | | | |
| $N_{oc}$ NOTE 2 | dBm/15kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 11 | -3 | 11 | -3 | 11 |
| $\hat{E}_s / I_{ot}$ NOTE 3 | dB | 11 | -3 | 11 | -3 | 11 |
| RSRP NOTE 3 | dBm/15kHz | -87 | -101 | -87 | -101 | -87 |
| $Q_{rxlevmin}$ | dBm/15kHz | -140 | | | | |
| $S_{nonintrasearch}$ | dB | Not sent | | | | |
| $Thresh_{serving, low}$ | dB | 46 (-94dBm) | | | | |
| $Thresh_{x, low}$ NOTE 4 | dB | 24 (-79dBm) | | | | |
| Propagation Condition | | AWGN | | | | |

| | | |
|---|---|---|
| Antenna Configuration | | 1x2 |
| NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.<br>NOTE 3: $E_s/I_{ot}$ and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>NOTE 4: This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell. | | |

**Table A.4.3.2A.1-3: UTRA TDD Cell specific test parameters for E-UTRA FDD to UTRA TDD inter-RAT cell reselection test case in AWGN**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | | | DwPTS | | | | |
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number NOTE 1 | | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | | | | | |
| DwPCH_Ec/Ior | dB | | | | | | 0 | | | | |
| OCNS_Ec/Ior | dB | -3 | | | | | | | | | |
| $I_{oc}$ | dBm/ 1.28 MHz | -80 | | | | | | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 | -3 | -3 |
| PCCPCH RSCP | dBm | -86 | -72 | -86 | -86 | -86 | n.a. | | | | |
| Propagation Condition | | AWGN | | | | | | | | | |
| $Q_{rxlevmin}$ | dBm | -103 | | | | | | | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | | | | | | | |
| $Qhyst1_s$ | dB | 0 | | | | | | | | | |
| $S_{prioritysearch1}$ | dB | 24 (-79dBm) | | | | | | | | | |
| $S_{prioritysearch2}$ | dB | 0 | | | | | | | | | |
| $Thresh_{x, high}$ NOTE 2 | dB | 46 (-94dBm) | | | | | | | | | |
| $Ssearch_{E-UTRA}$ | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>NOTE 2: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

**Table A.4.3.2A.1-4:**

| Parameter | Unit | Cell 3 (UTRA TDD) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | | | DwPTS | | | | |
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number NOTE 1 | | Randomly selected from 4, 5, 6, 7 such that cell 3 is in the reduced performance group | | | | | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | | | | | |
| DwPCH_Ec/Ior | dB | | | | | | 0 | | | | |
| OCNS_Ec/Ior | dB | -3 | | | | | | | | | |
| $I_{oc}$ | dBm/ 1.28 MHz | -80 | | | | | | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -3 | -3 | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 |
| PCCPCH RSCP | dBm | -86 | -86 | -86 | -72 | -86 | n.a. | | | | |
| Propagation Condition | | AWGN | | | | | | | | | |
| $Q_{rxlevmin}$ | dBm | -103 | | | | | | | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | | | | | | | |
| $Qhyst1_s$ | dB | 0 | | | | | | | | | |
| $S_{prioritysearch1}$ | dB | 24 (-79dBm) | | | | | | | | | |
| $S_{prioritysearch2}$ | dB | 0 | | | | | | | | | |
| $Thresh_{x, high}$ NOTE 2 | dB | 46 (-94dBm) | | | | | | | | | |

| | | |
|---|---|---|
| $Ssearch_{E-UTRA}$ | dB | Not send |
| Time offset to cell1 | ms | 3 |
| Time offset to cell2 | µs | 3 |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | |
| NOTE 2: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | |

## A.4.3.2A.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send the SYNCH-UL sequence in the UpPTS on cell 2, 3 for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.2A.2-1

**Table A.4.3.2A.2-1: Test requirements for E-UTRA FDD to UTRA TDD inter-RAT cell reselection**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T1 | Cell 2 (normal performance group) | 58.9 |
| T3 | Cell 3 (reduced performance group) | 462.1 |

The rate of correct cell reselections observed during repeated tests shall be at least 90%, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time.

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: $N_{UTRA_carrier_TDD,normal}$ *$T_{evaluateUTRA_TDD}$ + $T_{SI_UTRA}$, and to a reduced performance group cell can be expressed as: 6 * $N_{UTRA_carrier_TDD,reduced}$ * $T_{evaluateUTRA_TDD}$ + $T_{SI_UTRA}$,

Where:

$T_{evaluateUTRA_TDD}$ 19.2s, See Table 4.2.2.5.2-1

$T_{SI_UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 3 * 19.2 + 1.28 = 58.88 s for normal performance group reselection and 6 * 4 * 19.2 + 1.28 = 462.08s for reduced performance group reselection, allow 58.9s for normal performance group and 462.1s for reduced performance group in the test case.

Since only one E-UTRA frequency is configured and signal level of UTRA cell is lower than threshold of $S_{prioritysearch}$, the UE shall select back to cell 1 (E-UTRA cell) within $K_{carrier}$ * $T_{evaluateEUTRA}$ + $T_{SI}$ = 19.2 + 1.28 = 20.48s.

## A.4.3.3 E-UTRAN TDD – UTRAN FDD:

## A.4.3.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA TDD- UTRA FDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.1 when the UTRA cell is of lower priority.

The test scenario comprises of one UTRA FDD and one E-UTRA TDD cells as given in tables A.4.3.3.1-1, A.4.3.3.1-2 and A.4.3.3.1-3. The test consists of two successive time periods, with time duration of T1 andT2 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

**Table A.4.3.3.1-1: General test parameters for EUTRA TDD- lower priority UTRA FDD inter RAT cell re-selection test case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | |
| T2 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell1 | |
| E-UTRA PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| E_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 85 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.3.3.1-2: Cell specific test parameters for cell 1(E-UTRA)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA NOTE 1 | dB | | |
| OCNG_RB NOTE 1 | dB | | |
| Qqualmin for UTRA neighbour cell | dB | -20 | |
| Qrxlevmin for UTRA neighbour cell | dBm | -115 | |
| Qrxlevmin | dBm | -140 | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -86 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 12 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 12 | -4 |
| $Treselection_{EUTRAN}$ | s | 0 | |
| Snonintrasearch | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 44 | |
| $Thresh_{x, low}$ (NOTE 2) | dB | 42 | |
| Propagation Condition | | AWGN | |

NOTE 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2 : This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell

**Table A.4.3.3.1-3: Cell specific test parameters for cell 2 (UTRA)**

| Parameter | Unit | Cell 2 (UTRA) | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | Channel 2 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| OCNS_Ec/Ior | dB | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | 13 | 13 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | |
| CPICH_Ec/Io | dB | -10.21 | -10.21 |
| CPICH_RSCP | dBm | -67 | -67 |
| Propagation Condition | | AWGN | |
| Qqualmin | dB | -20 | |
| Qrxlevmin | dBm | -115 | |
| QrxlevminEUTRA | dBm | -140 | |
| UE_TXPWR_MAX_RACH | dBm | 21 | |
| Treselection | s | 0 | |
| Sprioritysearch1 | dB | 42 | |
| Sprioritysearch2 | dB | 0 | |
| $Thresh_{x, high}$ (NOTE 1) | dB | 48 | |
| NOTE 1 : This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | |

### A.4.3.3.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_FDD} + T_{SI-UTRA}$

Where:

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

## A.4.3.3A Idle mode TDD to UTRA FDD interRAT reselection

### A.4.3.3A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA TDD-UTRA FDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4.

The test scenario comprises of indicating 8 UTRA FDD interfrequency cells on 6 different carriers in the neighbour list of cell 1 as given in table A.4.3.3A.1-2 and table A.4.3.3A.1-3 and cells 2 and 3 as given in table A.4.3.3A.1-4. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3 and T4 respectively.

In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 6 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other frequencies configured to the UE in the test.

Cell 1, 2 and 3 4 are identified by the UE during time period T0. Cell 1, cell 2 and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3. Cells 1, 2 and 3 4 all have lower absolute priority than cell 1.

**Table A.4.3.3A.1-1: General test parameters for E-UTRAN TDD- UTRAN FDD inter frequency cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell 1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell 1, cell 3 | |
| T2 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T2 |
| | Neighbour cell | | Cell 2, cell 3 | |
| T3 end condition | Active cell | | Cell 3 | UE shall perform reselection to cell 3 during T3 |
| | Neighbour cell | | Cell 1, cell 2 | |
| T4 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T4 |
| | Neighbour cell | | Cell 2, cell 3 | |
| UE configured E-UTRA RF Channel Number | | | 1 | Serving cell and six UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |
| UE configured UTRA RF Channel Number | | | 2,3,4,5,6,7 | |
| Test eqipment configuration | | | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7 | |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (test equipment frequency selection and configuration time) + 960 | Initialisation time need to be defined so that cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |

| | | | |
|---|---|---|---|
| T2 | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |
| T3 | s | 350 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.3.3A.1-2: General test parameters for EUTRA TDD- UTRA FDD inter RAT cell re-selection test case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |

**Table A.4.3.3A.1-3: Cell specific test parameters for E-UTRAN TDD- UTRAN FDD inter-RAT cell reselection test case in AWGN cell 1 (E-UTRAN)**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | |
| Io | dBm/4.5 MHz(25 RB)<br><br>dBm/9Mhz (50RB) | -59.06<br><br>-56.05 | -71.77<br><br>-68.76 | -59.06<br><br>-56.05 | -71.77<br><br>-68.76 | -59.06<br><br>-56.05 |
| PDSCH parameters: DL Reference Measurement Channel | | OP.10 TDD(5MHz)<br>OP.2 TDD (10MHz) | | | | |
| PBCH RA | dB | 0 | | | | |
| PBCH RB | dB | | | | | |
| PSS RA | dB | | | | | |
| SSS RA | dB | | | | | |
| PCFICH RB | dB | | | | | |
| PHICH RA | dB | | | | | |
| PHICH RB | dB | | | | | |
| PDCCH RA | dB | | | | | |
| PDCCH RB | dB | | | | | |
| PDSCH RA | dB | | | | | |
| PDSCH RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| Qrxlevmin | dBm | -140 | | | | |
| $N_{oc}$ Note 2 | dBm | -98 | | | | |
| RSRP Note 3 | dBm | -84 | -102 | -84 | -102 | -84 |
| $\hat{E}_s / I_{ot}$ | dB | 14 | -4 | 14 | -4 | 14 |
| $\hat{E}_s / N_{oc}$ | dB | 14 | -4 | 14 | -4 | 14 |
| $Treselection_{EUTRAN}$ | s | 0 | | | | |
| Snonintrasearch | dB | 62 | | | | |
| $Thresh_{serving, low}$ | dB | 44 | | | | |
| $Thresh_{x, low}$ (Note 4) | dB | 40 | | | | |
| Propagation Condition | | AWGN | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | This refers to the value of $Thresh_{x,\ low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell. |

**Table A.4.3.3A.1-4: Cell specific test parameters for cells 2 and 3 (UTRA)**

| Parameter | Unit | Cell 2 | | | | | Cell 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number | | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | Randomly selected from 4, 5, 6 such that cell 3 is in the reduced performance group | | | | |
| CPICH_Ec/Ior | dB | -10 | | | | | -10 | | | | |
| PCCPCH_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| SCH_Ec/Ior | dB | -12 | | | | | -12 | | | | |
| PICH_Ec/Ior | dB | -15 | | | | | -15 | | | | |
| OCNS_Ec/Ior | dB | -0.941 | | | | | 0.941 | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | +11 | +11 | +11 | -5 | +11 | +11 | -5 | +11 | +11 | +11 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | | | | | -70 | | | | |
| CPICH_Ec/Io | dB | -10.33 | -10.33 | -10.33 | -16.19 | -10.33 | -10.33 | -16.19 | -10.36 | -10.33 | -10.33 |
| CPICH_RSCP | dBm | -69 | -69 | -69 | -85 | -69 | -69 | -85 | -69 | -69 | -69 |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Qqualmin | dB | -20 | | | | | -20 | | | | |
| Qrxlevmin | dBm | -115 | | | | | -115 | | | | |
| QrxlevminEUTRA | dBm | -140 | | | | | -140 | | | | |
| UE_TXPWR_MAX_RACH | dBm | 21 | | | | | 21 | | | | |
| Treselection | s | 0 | | | | | 0 | | | | |
| Sprioritysearch1 | dB | 40 | | | | | 40 | | | | |
| Sprioritysearch2 | dB | 0 | | | | | 0 | | | | |
| $Thresh_{x,high}$ (Note 1) | dB | 50 | | | | | 50 | | | | |
| Note 1: This refers to the value of $Thresh_{x,\ high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

## A.4.3.3A.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.1.5-1

**Table A.4.3.3A.2-1**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T0 | Cell 1 | |
| T1 | Cell 2 (normal performance group) | 59 |
| T2 | Cell 1 (normal performance group) | 21 |
| T3 | Cell 3 (reduced performance group) | 347 |
| T4 | Cell 1 (normal performance group) | 21 |

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: ($N_{UTRA_carrier,normal}$) * $T_{evaluateUTRA_FDD}$ + $T_{SI-UTRA}$ and to a reduced performance group cell can be expressed as: 6 * $N_{UTRA_carrier,reduced}$ * $T_{evaluateUTRA_FDD}$ + $T_{SI-UTRA.}$

Where:

$T_{evaluateUTRA-FDD}$ See Table 4.2.2.5.1-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 58.88 s for normal performance group reselection, allow 59 s, and gives a total of 346.88 s for reduced performance group reselection, allow 347 s for reduced performance group in the test case. For reselections back to cell 1 since only one frequency is configured, the requirement is $T_{evaluate,E-UTRAN}$ + $T_{SI}$ = 20.48 s, allow 21 s.

# A.4.3.4 E-UTRAN TDD – UTRAN TDD:

## A.4.3.4.1 E-UTRA to UTRA TDD cell re-selection: UTRA is of higher priority

### A.4.3.4.1.1 Test Purpose and Environment

#### A.4.3.4.1.1.1 Void

#### A.4.3.4.1.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell re-selection requirements specified in clause 4.2.2.5 when the UTRA cell is of higher priority.

This test scenario comprised of 1 E-UTRA TDD serving cell, and 1 UTRA TDD cell to be re-selected. Test parameters are given in table A.4.3.4.1.1.2-1, A.4.3.4.1.1.2-2, and A.4.3.4.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

**Table A.4.3.4.1.1.2-1: General test parameters for E-UTRAN to UTRAN (1.28 Mcps TDD OPTION) Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | UE is on cell 1 in the initialisation phase, so that reselection to cell 2 occurs during T2 |
| T2 end condition | Active cell | | Cell 2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell 1 | |
| T3 end condition | Active cell | | Cell 1 | UE shall perform reselection to cell 1 during T3 |
| | Neighbour cell | | Cell 2 | |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration of cell 1 | | | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| CP length of cell 1 | | | Normal | |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| $T_{reselection}$ | | s | 0 | |
| DRX cycle length | | s | 1,28 | |
| HCS | | | Not used | |
| T1 | | s | >20 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed, The intention is to |

| | | | |
|---|---|---|---|
| | | | ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | s | 85 | T2 needs to be defined so that cell re-selection reaction time is taken into account. |
| T3 | s | 25 | T3 needs to be defined so that cell re-selection reaction time is taken into account. |

**Table A.4.3.4.1.1.2-2: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 1)**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA NOTE 1 | dB | | | |
| OCNG_RB NOTE 1 | dB | | | |
| $Q_{rxlevmin}$ | dBm/15kHz | -140 | -140 | -140 |
| $N_{oc}$ | dBm/15kHz | -98 | | |
| RSRP | dBm/15kHz | -87 | -87 | -87 |
| $\hat{E}_s / I_{ot}$ | dB | 11 | 11 | 11 |
| $Thresh_{x, high}$ (NOTE 2) | dB | 24(-79dBm) | | |
| $S_{nonintrasearch}$ | dB | 46 | | |
| Propagation Condition | | AWGN | | |
| NOTE 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>NOTE 2: This refers to the value of $Thresh_{x, high}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell | | | | |

**Table A.4.3.4.1.1.2-3: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | | | |
|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | DwPTS | | |
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number (NOTE 1) | | Channel 2 | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | -3 | | | |
| DwPCH_Ec/Ior | dB | | | | 0 | 0 | 0 |
| OCNS_Ec/Ior | dB | -3 | -3 | -3 | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -inf | 11 | -3 | -inf | 11 | -3 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | | | |
| PCCPCH RSCP | dBm | -inf | -72 | -86 | n.a. | | |
| Propagation Condition | | AWGN | | | | | |
| $Q_{rxlevmin}$ | dBm | -103 | | | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | | | |
| $Qhyst1_s$ | dB | 0 | | | | | |

| | | |
|---|---|---|
| $S_{nonintrasearch}$ | dB | Not sent |
| $Thresh_{serving, low}$ | dB | 24 (-79dBm) |
| $Thresh_{x, low}$ (NOTE 2) | dB | 46 (-94dBm) |
| NOTE 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>NOTE 2: This refers to the value of $Thresh_{x, low}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | |

A.4.3.4.1.1.3 Void

### A.4.3.4.1.2 Test Requirements

A.4.3.4.1.2.1 Void

A.4.3.4.1.2.2 1.28 Mpcs TDD option

The cell reselection delay to higher priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to higher priority shall be less than 81 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluateUTRA_TDD} + T_{SI_UTRA}$,

Where:

$T_{higher_priority_search}$ 60s, See clause 4.2.2

$T_{evaluateUTRA_TDD}$ 19.2s, See Table 4.2.2.5.2-1

$T_{SI_UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 80.48 s, allow 81 s for higher priority cell reselection in the test case.

A.4.3.4.1.2.3 Void

## A.4.3.4.2 E-UTRA to UTRA TDD cell re-selection: UTRA is of lower priority

### A.4.3.4.2.1 Test Purpose and Environment

A.4.3.4.2.1.1 Void

A.4.3.4.2.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell re-selection requirements specified in clause 4.2.2.5 when the UTRA cell is of lower priority.

This test scenario comprised of 1 E-UTRA TDD serving cell (Cell 1), and 1 UTRA TDD cell (Cell 2) to be re-selected. Test parameters are given in table A.4.3.4.2.1.2-1, A.4.3.4.2.1.2-2, and A.4.3.4.2.1.2-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Cell 2 is of lower priority than cell 1.

The ranking of the cells shall be made according to the cell reselection criteria specified in TS36.304.

**Table A.4.3.4.2.1.2-1: General test parameters for E-UTRAN to UTRAN (1.28 Mcps TDD OPTION) Cell Re-selection**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | E-UTRAN cell |
| T1 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | 1.28 Mcps TDD OPTION cell |
| T2 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T2 |
| | Neighbour cell | | Cell1 | E-UTRA TDD cell |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration of cell 1 | | | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| CP length of cell 1 | | | Normal | |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure. |
| Treselection | | s | 0 | |
| DRX cycle length | | s | 1,28 | |
| HCS | | | Not used | |
| T1 | | s | 85 | |
| T2 | | s | 25 | |

**Table A.4.3.4.2.1.2-2: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| Qrxlevmin | dBm/15kHz | -140 | -140 |
| $N_{oc}$ | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -87 | -101 |
| $\hat{E}_s / I_{ot}$ | dB | 11 | -3 |
| $S_{nonintrasearch}$ | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 46 (-94dBm) | |
| $Thresh_{x, low}$ (Note2) | dB | 24 (-79dBm) | |
| Propagation Condition | | AWGN | |

Note1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note2: This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell

**Table A.4.3.4.2.1.2-3: Cell specific test parameters for cell re-selection E-UTRA TDD to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | |
|---|---|---|---|
| Timeslot Number | | 0 | DwPTS |

| | | T1 | T2 | T1 | T2 |
|---|---|---|---|---|---|
| UTRA RF Channel Number (Note1) | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior | dB | -3 | -3 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | 11 | 11 | 11 | 11 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -72 | -72 | n.a. | n.a. |
| Propagation Condition | | AWGN | | | |
| Qrxlevmin | dBm | -103 | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | |
| $Qhyst1_{s}$ | dB | 0 | | | |
| $Thresh_{x,\ high}$ (Note2) | dB | 46 (-94dBm) | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>Note2: This refers to the value of $Thresh_{x,\ high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | |

A.4.3.4.2.1.3 Void

### A.4.3.4.2.2 Test Requirements

A.4.3.4.2.2.1 Void

A.4.3.4.2.2.2 1.28 Mpcs TDD option

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequence in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2.

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_TDD} + T_{SI_UTRA}$,

Where:

$T_{evaluateUTRA_TDD}$ 19.2s, See Table 4.2.2.5.2-1

$T_{SI_UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s, allow 21 s for lower priority cell reselection in the test case.

A.4.3.4.2.2.3 Void

## A.4.3.4.3 EUTRA TDD-UTRA TDD cell reselection in fading propagation conditions: UTRA TDD is of lower priority

### A.4.3.4.3.1 Test Purpose and Environment

This test is to verify the requirement for the EUTRA TDD- UTRA TDD inter-RAT cell reselection requirements specified in clause 4.2.2.5.2 when the UTRA cell is of lower priority, and to verify the robustness of the UE measurement filtering in a fading environment. The E-UTRA cell is in fading propagation conditions and the UTRA cell is in AWGN propagation conditions.

The test scenario comprises of one UTRA TDD and one E-UTRA TDD cells as given in tables A.4.3.4.3.1-1, A.4.3.4.3.1-2 and A.4.3.4.3.1-3. The test consists of four successive time periods, with time duration of T1 T2, T3 and T4 respectively. Both E-UTRA cell 1 and UTRA cell 2 are already identified by the UE prior to the start of the test. Cell 2 is of lower priority than cell 1.

**Table A.4.3.4.3.1-1: General test parameters for EUTRA TDD- lower priority UTRA TDD inter RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | E-UTRAN cell |
| T1 end condition | Active cells | | Cell1 | UE shall perform reselection to cell 1 during T1 for subsequent iterations of the test |
| | Neighbour cell | | Cell2 | |
| T3 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T3 |
| | Neighbour cell | | Cell1 | |
| E-UTRA PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| E_UTRA Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | <85 | T1 need to be defined so that cell re-selection reaction time is taken into account. T1 is terminated when the UE starts to send preambles to cell 1 |
| T2 | | s | 64 | The start of T2 is defined as the time when the UE starts to send PRACH preambles to cell 1 |
| T3 | | s | <25 | T3 need to be defined so that cell re-selection reaction time is taken into account. T3 is terminated when the UE starts to send PRACH preambles to cell 2 |
| T4 | | s | 64 | The start of T4 is defined as the time when the UE starts to send PRACH preambles to cell 2 |

**Table A.4.3.4.3.1-2: Cell specific test parameters for cell 1 (E-UTRA)**

| Parameter | Unit | Cell 1 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | | | |
| PSS_RA | dB | 0 | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |
| Qrxlevmin for UTRA neighbour cell | dBm | -103 | | | |
| Qrxlevmin | dBm | -140 | | | |
| $N_{oc}$ | dBm/15 kHz | -104 | | | |
| RSRP | dBm/15 KHz | -82 | -82 | -107 | -107 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s / I_{ot}$ | dB | 22 | 22 | -3 | -3 |
| $\hat{E}_s / N_{oc}$ | dB | 22 | 22 | -3 | -3 |
| $Treselection_{EUTRAN}$ | s | 0 | | | |
| Snonintrasearch | dB | Not sent | | | |
| $Thresh_{serving, low}$ | dB | 44 | | | |
| $Thresh_{x, low}$ (Note 2) | dB | 24 | | | |
| Propagation Condition | | ETU70 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |
| Note 2: This refers to the value of $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA target cell. | | | | | |

**Table A.4.3.4.3.1-3: Cell specific test parameters for cell 2 (UTRA)**

| Parameter | Unit | Cell 2 (UTRA) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | | DwPTS | | | |
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number (Note1) | | Channel 2 | | | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | | | |
| DwPCH_Ec/Ior | dB | | | | | 0 | | | |
| OCNS_Ec/Ior | dB | -3 | | | | | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | | | | | |
| PCCPCH RSCP | dBm | -70 | -70 | -70 | -70 | n.a. | n.a. | n.a. | n.a. |
| Propagation Condition | | AWGN | | | | | | | |
| Qrxlevmin | dBm | -103 | | | | | | | |
| $Qrxlevmin_{EUTRA}$ | dBm | -140 | | | | | | | |
| UE_TXPWR_MAX_RACH | dBm | 21 | | | | | | | |
| Treselection | s | 0 | | | | | | | |
| $Thresh_{x, high}$ (Note2) | dB | 44 | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | | | | | | | | |
| Note2: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | |

### A.4.3.4.3.2 Test Requirements

The probability of reselection from cell 1 to cell 2 during T2 observed during testing shall be less than 10%

The probability of reselection from cell 2 to cell 1 during T4 observed during testing shall be less than 10%

The cell reselection delay to lower priority is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send the SYNCH-UL sequene in the UpPTS for sending the RRC CONNECTION REQUEST message on cell 2. In order to evaluate reselection delay, the system simulator first needs to verify that the UE is camped on cell 1 at the start of T3

The cell re-selection delay to lower priority shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateUTRA_TDD} + T_{SI-UTRA}$

Where:

$T_{evaluateUTRA_TDD}$ 19.2s, See Table 4.2.2.5.2-1

$T_{SI-UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for lower priority cell reselection, allow 21 s.

## A.4.3.4.4 E-UTRA TDD to UTRA TDD cell re-selection for IncMon

### A.4.3.4.4.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRA TDD to UTRA TDD inter-RAT cell reselection requirements for increased UE carrier monitoring specified in clause 4.2.2.4. UTRA TDD cells are of lower priority than E-UTRA serving cell.

The test scenario comprises of indicating 7 UTRA TDD inter-RAT cells on 7 different carriers in the neighbour list of cell 1 as given in tables A.4.3.4.4.1-1, A.4.3.4.4.1-2 and A.4.3.4.4.1-3. Each repetition of the test consists of five successive time periods, with time duration of T0, T1, T2, T3, and T4 respectively. In the initialisation phase and at the start of each repetition of T0, the test equipment provides signals for cell 1 (E-UTRA serving cell), and selects frequencies for cells 2 and 3 which are chosen from the 7 inter-RAT layers which are configured in the UE neighbour cell list as described in general and cell specific parameters. The neighbour lists of cells 2 and 3 shall include the frequency of cell 1 in the normal performance group and shall exclude the other UTRA TDD frequencies configured to the UE in the test.

Cell 1, 2, and 3 are identified by the UE during time phase T0. Cell 1, cell 2, and cell 3 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2 or 3.

**Table A.4.3.4.4.1-1: General test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| T0 | Active cell | | Cell1 | T0 is repeated on each repetition of the test. In T0 the test equipment selects frequencies for cell 2, 3 and then time is allowed for the UE to identify the neighbour cells. See cell specific parameters for detailed settings. |
| T1 start condition | Active cell | | Cell 1 | |
| T1 end condition | Active cell | | Cell2 | UE shall perform reselection to cell 2 during T1 |
| | Neighbour cell | | Cell1 | |
| T2 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 during T2 |
| T3 end condition | Active cell | | Cell3 | UE shall perform reselection to cell 3 during T3 |
| | Neighbour cell | | Cell1 | |
| T4 end condition | Active cell | | Cell1 | UE shall perform reselection to cell 1 in T4 so that next repetition of test can start from T0 |
| UE configured UTRA RF Channel Number | | | 1, 2, 3, 4, 5, 6, 7 | **Seven UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 4, 5, 6, and 7 are indicated to have reduced performance** |
| Test eqipment configuration | | | Cell 1, 2, 3 | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2 is randomly selected to use different frequencies selected from UTRA frequencies 1, 2, 3.<br>Cells 3 is randomly selected to use different frequencies selected from UTRA frequencies 4, 5, 6, 7. |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 [16] |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 [16] |
| CP length of cell 1 | | | normal | |
| PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 [16] |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| $T_{reselection}$ | | s | 0 | |
| HCS | | | Not used | |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T0 | | s | (Test equipment frequency selection and configuration time) + 960 | T0 is defined so that the Test equipment selects frequencies and configures the cells, then the UE cell detection time is taken into account. |
| T1 | | s | 60 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 25 | T2 need to be defined so that cell re-selection reaction time is taken into account |

| | | | |
|---|---|---|---|
| T3 | s | 500 | T3 need to be defined so that cell re-selection reaction time is taken into account. |
| T4 | s | 25 | T4 need to be defined so that cell re-selection reaction time is taken into account |

**Table A.4.3.4.4.1-2: E-UTRA Cell specific test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell reselection test case in AWGN**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T0 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | | | |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ Note 2 | dBm/15kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 11 | -3 | 11 | -3 | 11 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 11 | -3 | 11 | -3 | 11 |
| RSRP Note 3 | dBm/15kHz | -87 | -101 | -87 | -101 | -87 |
| $Q_{rxlevmin}$ | dBm/15kHz | -140 | | | | |
| $S_{nonintrasearch}$ | dB | Not sent | | | | |
| $Thresh_{serving, low}$ | dB | 46 (-94dBm) | | | | |
| $Thresh_{X, low}$ Note 4 | dB | 24 (-79dBm) | | | | |
| Propagation Condition | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 3: $E_s/I_{ot}$ and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: This refers to the value of $Thresh_{X, low}$ which is included in E-UTRA system information, and is a threshold for the UTRA TDD target cell.

**Table A.4.3.4.4.1-3: UTRA TDD Cell specific test parameters for E-UTRA TDD to UTRA TDD inter-RAT cell reselection test case in AWGN**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | | | DwPTS | | | | |
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number Note1 | | Randomly selected from 1, 2, 3 such that cell 2 is in the normal performance group | | | | | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | | | | | |
| DwPCH_Ec/Ior | dB | | | | | | 0 | | | | |
| OCNS_Ec/Ior | dB | -3 | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $I_{oc}$ | dBm/ 1.28 MHz | -80 | | | | | | | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 | -3 | -3 |
| PCCPCH RSCP | dBm | -86 | -72 | -86 | -86 | -86 | n.a. | | | | |
| Propagation Condition | | AWGN | | | | | | | | | |
| $Q_{rxlevmin}$ | dBm | -103 | | | | | | | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | | | | | | | |
| $Qhyst1_{s}$ | dB | 0 | | | | | | | | | |
| $S_{prioritysearch1}$ | dB | 24 (-79dBm) | | | | | | | | | |
| $S_{prioritysearch2}$ | dB | 0 | | | | | | | | | |
| $Thresh_{x, low}$ Note2 | dB | 46 (-94dBm) | | | | | | | | | |
| $Ssearch_{E-UTRA}$ | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | | | | | | | | | | |
| Note2: This refers to the value of $Thresh_{x, low}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

**Table A.4.3.4.4.1-4:**

| Parameter | Unit | Cell 3 (UTRA TDD) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | | | DwPTS | | | | |
| | | T0 | T1 | T2 | T3 | T4 | T0 | T1 | T2 | T3 | T4 |
| UTRA RF Channel Number Note1 | | Randomly selected from 4, 5, 6, 7 such that cell 3 is in the reduced performance group | | | | | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | | | | | |
| DwPCH_Ec/Ior | dB | | | | | | 0 | | | | |
| OCNS_Ec/Ior | dB | -3 | | | | | | | | | |
| $I_{oc}$ | dBm/ 1.28 MHz | -80 | | | | | | | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -3 | -3 | -3 | 11 | -3 | -3 | -3 | -3 | 11 | -3 |
| PCCPCH RSCP | dBm | -86 | -86 | -86 | -72 | -86 | n.a. | | | | |
| Propagation Condition | | AWGN | | | | | | | | | |
| $Q_{rxlevmin}$ | dBm | -103 | | | | | | | | | |
| $Qoffset1_{s,n}$ | dB | C1, C2: 0 | | | | | | | | | |
| $Qhyst1_{s}$ | dB | 0 | | | | | | | | | |
| $S_{prioritysearch1}$ | dB | 24 (-79dBm) | | | | | | | | | |
| $S_{prioritysearch2}$ | dB | 0 | | | | | | | | | |
| $Thresh_{x, high}$ Note2 | dB | 46 (-94dBm) | | | | | | | | | |
| $Ssearch_{E-UTRA}$ | dB | Not send | | | | | | | | | |
| Time offset to cell1 | ms | 3 | | | | | | | | | |
| Time offset to cell2 | µs | 3 | | | | | | | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | | | | | | | | | | |
| Note2: This refers to the value of $Thresh_{x, high}$ which is included in UTRA system information, and is a threshold for the E-UTRA target cell | | | | | | | | | | | |

### A.4.3.4.4.2 Test Requirements

The cell reselection delay is defined as the time from the beginning of a relevant time period, to the moment when the UE camps on the target cell, and starts to send the SYNCH-UL sequence in the UpPTS on cell 2, 3 for sending the RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on the target cell.

The reselection delays shall meet the requirements in table A.4.3.4.4.2-1

**Table A.4.3.4.4.2-1: Test requirements for E-UTRA TDD to UTRA TDD inter-RAT cell reselection**

| Time phase | Target cell | Requirement for reselection delay (seconds) |
|---|---|---|
| T1 | Cell 2 (normal performance group) | 58.9 |
| T3 | Cell 3 (reduced performance group) | 462.1 |

The rate of correct cell reselections observed during repeated tests shall be at least 90%, with a successful reselection counted if it is within the required time regardless of the carrier frequencies involved. At least 90% of reselections to the reduced performance group shall be within the required time, and at least 90% of reselections to the normal performance group shall be within the required time.

NOTE: The cell re-selection delay to a normal performance group cell can be expressed as: $N_{UTRA_carrier_TDD,normal} * T_{evaluateUTRA_TDD} + T_{SI_UTRA}$, and to a reduced performance group cell can be expressed as: $6 * N_{UTRA_carrier_TDD,reduced} * T_{evaluateUTRA_TDD} + T_{SI_UTRA}$,

Where:

$T_{evaluateUTRA_TDD}$ 19.2s, See Table 4.2.2.5.2-1

$T_{SI_UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 3 * 19.2 + 1.28 = 58.88 s for normal performance group reselection and 6 * 4 * 19.2 + 1.28 = 462.08s for reduced performance group reselection, allow 58.9s for normal performance group and 462.1s for reduced performance group in the test case.

Since only one E-UTRA frequency is configured and signal level of UTRA cell is lower than threshold of $S_{prioritysearch}$, the UE shall select back to cell 1 (E-UTRA cell) within $K_{carrier} * T_{evaluateEUTRA} + T_{SI} = 19.2 + 1.28 = 20.48$s, allow 21s.

# A.4.4 E-UTRAN to GSM Cell Re-Selection

## A.4.4.1 E-UTRAN FDD – GSM:

### A.4.4.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to GSM cell re-selection delay reported in clause 4.2.2.5.

This scenario implies the presence of 1 E-UTRAN serving cell, and 1 GSM cell to be re-selected. The UE is requested to monitor neighbouring cells on 1 E-UTRA carrier and 12 GSM cells. Test parameters are given in Table, A.4.4.1-1, A.4.4.1-2, A.4.4.1-3. E-UTRA FDD cell (Cell 1) and GSM cell (cell 2) shall belong to different Location Areas. The test comprises two successive time periods, T1 and T2. During initialization before the start of the test, the UE is camped on cell 1. By the end of T1, the UE has identified BSIC on the GSM BCCH carrier of cell 2 but the signal levels do not meet the reselection criterion during T1. At the start of T2, the signal levels change such that cell 2 satisfies reselection criterion. The GSM layer is configured at a lower priority than the serving E-UTRA FDD layer.

**Table A.4.4.1-1: General test parameters for E-UTRA FDD GSM cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | UE shall be forced to cell 1 in the initialisation phase and shall be able to detect and monitor the 4 strongest GSM BCCH carriers in T1 . Cell 1 is an E-UTRA FDD cell. |
| Final condition | Neighbour cell | | Cell2 | UE shall perform reselection to cell 2 during T2. Cell 2 is a GSM cell. |
| E-UTRA RF Channel Number | | | 1 | 1 E-UTRA FDD carrier frequency |
| GSM ARFCN | | | 1 | 12 GSM BCCH carriers are used |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| CP length of cell 1 | | | Normal | |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 35 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 35 | T2 need to be defined so that the higher layer search periodicity and cell re-selection reaction time are taken into account. |
| Propagation channel | | | AWGN | |

**Table A.4.4.1-2: Cell-specific test parameters for Cell 1 – E-UTRA FDD cell**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| Qrxlevmin | dBm | -140 | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $T_{reselectionEUTRAN}$ | s | 0 | |
| $S_{nonintrasearch}$ | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 44 | |
| $Thresh_{x, low}$ (Note 2) | dB | 24 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for GSM target cell.

**Table A.4.4.1-3: Cell-specific test parameters for Cell 2 – GSM cell**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -90 | -75 |
| RXLEV_ACCESS_MIN | dBm | -105 | |
| MS_TXPWR_MAX_CCH | dBm | 24 | |

## A.4.4.1.2 Test Requirements

The cell re-selection delay is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send the RR Channel Request message for location update to Cell 2.

The cell re-selection delay shall be less than 26 s + $T_{BCCH,}$ where $T_{BCCH}$ is the maximum time allowed to read BCCH data from GSM cell [8].

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay can be expressed as: 4* $T_{measureGSM}$ + $T_{BCCH}$, where:

$T_{measureGSM}$ See Table 4.2.2.5.3-1 in clause 4.2.2.5.3.

$T_{BCCH}$ Maximum time allowed to read BCCH data from GSM cell [8].
According to [8], the maximum time allowed to read the BCCH data, when being synchronized to a BCCH carrier, is 1.9 s.

This gives a total of 25.6 s + $T_{BCCH}$, allow 26 s + $T_{BCCH}$ in the test case.

## A.4.4.2 E-UTRAN TDD – GSM:

### A.4.4.2.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to GSM cell re-selection delay reported in clause 4.2.2.5.

This scenario implies the presence of 1 E-UTRAN serving cell, and 1 GSM cell to be re-selected. The UE is requested to monitor neighbouring cells on 1 E-UTRA carrier and 12 GSM cells. Test parameters are given in Table, A.4.4.2-1, A.4.4.2-2, A.4.4.2-3. E-UTRA TDD cell (Cell 1) and GSM cell (cell 2) shall belong to different Location Areas. The test comprises two successive time periods, T1 and T2. During initialization before the start of the test, the UE is camped on cell 1. By the end of T1, the UE has identified BSIC on the GSM BCCH carrier of cell 2 but the signal levels do not meet the reselection criterion during T1. At the start of T2, the signal levels change such that cell 2 satisfies reselection criterion. The GSM layer is configured at a lower priority than the serving E-UTRA TDD layer.

**Table A.4.4.2-1: General test parameters for E-UTRA TDD GSM cell re-selection test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell1 | UE shall be forced to cell 1 in the initialisation phase and shall be able to detect and monitor the 4 strongest GSM BCCH carriers in T1. Cell 1 is an E-UTRA TDD cell. |
| Final condition | Neighbour cell | | Cell2 | UE shall perform reselection to cell 2 during T2. Cell 2 is a GSM cell. |
| E-UTRA RF Channel Number | | | 1 | 1 E-UTRA TDD carrier frequency |
| GSM ARFCN | | | 1 | 12 GSM BCCH carriers are used |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration for cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| PRACH configuration for cell 1 | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| CP length of cell 1 | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| DRX cycle length | | s | 1.28 | The value shall be used for all cells in the test. |
| T1 | | s | 35 | T1 need to be defined so that cell re-selection reaction time is taken into account. |
| T2 | | s | 35 | T2 need to be defined so that the higher layer search periodicity and cell re-selection reaction time are taken into account. |
| Propagation channel | | | AWGN | |

**Table A.4.4.2-2: Cell-specific test parameters for Cell 1 – E-UTRA TDD cell**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |

| | | | |
|---|---|---|---|
| PHICH_RB | dB | 0 | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| Qrxlevmin | dBm | -140 | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $T_{reselectionEUTRAN}$ | s | 0 | |
| $S_{nonintrasearch}$ | dB | Not sent | |
| $Thresh_{serving, low}$ | dB | 44 | |
| $Thresh_{x, low}$ (Note 2) | dB | 24 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to $Thresh_{x, low}$ which is included in E-UTRA system information, and is a threshold for GSM target cell.

**Table A.4.4.2-3: Cell-specific test parameters for Cell 2 – GSM cell**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -90 | -75 |
| RXLEV_ACCESS_MIN | dBm | -105 | |
| MS_TXPWR_MAX_CCH | dBm | 24 | |

### A.4.4.2.2 Test Requirements

The cell re-selection delay is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send the RR Channel Request message for location update to Cell 2.

The cell re-selection delay shall be less than 26 s + $T_{BCCH,}$ where $T_{BCCH}$ is the maximum time allowed to read BCCH data from GSM cell [8].

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay can be expressed as: 4* $T_{measureGSM}$ + $T_{BCCH}$, where:

$T_{measureGSM}$ See Table 4.2.2.5.3-1 in clause 4.2.2.5.3.

$T_{BCCH}$ Maximum time allowed to read BCCH data from GSM cell [8].
According to [8], the maximum time allowed to read the BCCH data, when being synchronized to a BCCH carrier, is 1.9 s.

This gives a total of 25.6 s + $T_{BCCH}$, allow 26 s + $T_{BCCH}$ in the test case.

# A.4.5 E-UTRAN to HRPD Cell Re-Selection

## A.4.5.1 E-UTRAN FDD – HRPD

### A.4.5.1.1 E-UTRAN FDD – HRPD Cell Reselection: HRPD is of Lower Priority

#### A.4.5.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD- HRPD inter-RAT cell reselection requirements specified in clause 4.2.2.5.4 when the HRPD cell is of lower priority.

The test scenario comprises of one HRPD and one E-UTRAN FDD cells as given in tables A.4.5.1.1.1-1, A.4.5.1.1.1-2 and A.4.5.1.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN FDD cell 1 and HRPD cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

**Table A.4.5.1.1.1-1: General Test Parameters for E-UTRAN FDD - lower priority HRPD Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbour cell | | Cell 2 | HRPD cell |
| Final condition | Active cell | | Cell 2 | HRPD cell is selecting during T2 |
| DRX cycle length | | s | 1.28 | |
| E-UTRA FDD RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA FDD Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| HRPD RF Channel Number | | | 1 | Only one HRPD carrier frequency is used. |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E_UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 | |
| T2 | | s | 30 | |

**Table A.4.5.1.1.1-2: Cell Specific Test Parameters for E-UTRAN FDD (Cell # 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $Treselection_{EUTRAN}$ | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| $S_{ServingCell}$ | dB | 51 | 38 |
| $Thresh_{serving, low}$ | dB | 44 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.4.5.1.1.1-3: Cell Specific Test Parameters for HRPD (cell # 2)**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| HRPD RF Channel Number | | 1 | |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | |
| $\hat{I}_{or} / I_{oc}$ | dB | 0 | 0 |
| $I_{oc}$ | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -3 | -3 |
| Propagation Condition | | AWGN | |
| $S_{nonServingCell,x}$ | | -6 | |
| Treselection | s | 0 | |
| hrpd-CellReselectionPriority | - | 0 | |
| $Thresh_{x, low}$ | | -14 | |

### A.4.5.1.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateHRPD} + T_{SI-HRPD}$

Where:

$T_{evaluatHRPD}$ See Table 4.2.2.5.4-1

$T_{SI-HRPD}$ Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1704 ms is assumed in this test case.

This gives a total of 20.904 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.5.2 E-UTRAN TDD – HRPD

### A.4.5.2.1 E-UTRAN TDD – HRPD Cell Reselection: HRPD is of Lower Priority

#### A.4.5.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD- HRPD inter-RAT cell reselection requirements specified in clause 4.2.2.5.4 when the HRPD cell is of lower priority.

The test scenario comprises of one HRPD and one E-UTRAN TDD cells as given in tables A.4.5.2.1.1-1, A.4.5.2.1.1-2 and A.4.5.2.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN TDD cell 1 and HRPD cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

**Table A.4.5.2.1.1-1: General Test Parameters for E-UTRAN TDD - lower priority HRPD Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | E-UTRAN TDD cell |
| | Neighbour cell | | Cell 2 | HRPD cell |
| Final condition | Active cell | | Cell 2 | HRPD cell is selecting during T2 |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | Normal | |
| DRX cycle length | s | 1.28 | |
| E-UTRA TDD RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| E-UTRA TDD Channel Bandwidth (BWchannel) | MHz | 10 | |
| HRPD RF Channel Number | | 1 | Only one HRPD carrier frequency is used. |
| E-UTRA TDD PRACH configuration of cell 1 | | 53 | As specified in table 4.7.1-3 in TS 36.211 |
| E_UTRA TDD Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| T1 | s | 30 | |
| T2 | s | 30 | |

**Table A.4.5.2.1.1-2: Cell Specific Test Parameters for E-UTRAN TDD (Cell # 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $Treselection_{EUTRAN}$ | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| $S_{ServingCell}$ | dB | 51 | 38 |
| $Thresh_{serving, low}$ | dB | 44 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

**Table A.4.5.2.1.1-3: Cell Specific Test Parameters for HRPD (cell # 2)**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| HRPD RF Channel Number | | 1 | |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | |
| $\hat{I}_{or} / I_{oc}$ | dB | 0 | 0 |
| $I_{oc}$ | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -3 | -3 |
| Propagation Condition | | AWGN | |
| $S_{nonServingCell,x}$ | | -6 | |
| Treselection | s | 0 | |
| hrpd-CellReselectionPriority | - | 0 | |
| $Thresh_{x, low}$ | | -14 | |

### A.4.5.2.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluateHRPD} + T_{SI-HRPD}$

Where:

$T_{evaluatHRPD}$ See Table 4.2.2.5.4-1

$T_{SI-HRPD}$ Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1704 ms is assumed in this test case.

This gives a total of 20.904 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.6 E-UTRAN to cdma2000 1X Cell Re-Selection

### A.4.6.1 E-UTRAN FDD – cdma2000 1X

### A.4.6.1.1 E-UTRAN FDD – cdma2000 1X Cell Reselection: cdma2000 1X is of Lower Priority

### A.4.6.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD- cdma2000 1X inter-RAT cell reselection requirements specified in clause 4.2.2.5.5 when the cdma2000 1X cell is of lower priority.

The test scenario comprises of one cdma2000 1X and one E-UTRAN FDD cells as given in tables A.4.6.1.1.1-1, A.4.6.1.1.1-2 and A.4.6.1.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN FDD cell 1 and cdma2000 1X cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

**Table A.4.6.1.1.1-1: General Test Parameters for E-UTRAN FDD - lower priority cdma2000 1X Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbour cell | | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell | | Cell 2 | cdma2000 1X cell is selecting during T2 |
| DRX cycle length | | s | 1.28 | |
| E-UTRA FDD RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA FDD Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| cdma2000 1X RF Channel Number | | | 1 | Only one cdma2000 1X carrier frequency is used. |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E_UTRA FDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 | |
| T2 | | s | 30 | |

**Table A.4.6.1.1.1-2: Cell Specific Test Parameters for E-UTRAN FDD (Cell # 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $Treselection_{EUTRAN}$ | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| $S_{ServingCell}$ | dB | 51 | 38 |
| $Thresh_{serving, low}$ | dB | 44 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.6.1.1.1-3: Cell Specific Test Parameters for cdma2000 1X (cell # 2)**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| cdma2000 1X RF Channel Number | | 1 | |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | |
| $\hat{I}_{or} / I_{oc}$ | dB | 0 | 0 |
| $I_{oc}$ | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -10 | -10 |
| Propagation Condition | | AWGN | |
| $S_{nonServingCell,x}$ | | -20 | |
| Treselection | s | 0 | |
| oneXRTT-CellReselectionPriority | - | 0 | |
| $Thresh_{x, low}$ | | -28 | |

### A.4.6.1.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluatecdma2000\ 1X} + T_{SI\text{-}cdma2000\ 1X}$

Where:

$T_{evaluatcdma2000\ 1X}$ See Table 4.2.2.5.5-1

$T_{SI\text{-}cdma2000\ 1X}$ Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.6.2 E-UTRAN TDD – cdma2000 1X

### A.4.6.2.1 E-UTRAN TDD –cdma2000 1X Cell Reselection: cdma2000 1X is of Lower Priority

#### A.4.6.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD- cdma2000 1X inter-RAT cell reselection requirements specified in clause 4.2.2.5.5 when the cdma2000 1X cell is of lower priority.

The test scenario comprises of one cdma2000 1X and one E-UTRAN TDD cells as given in tables A.4.6.2.1.1-1, A.4.6.2.1.1-2 and A.4.6.2.1.1-3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both E-UTRAN TDD cell 1 and cdma2000 1X cell 2 are already identified by the UE prior to the start of the test. At T1 the UE is camped on to cell 1. Cell 2 is of lower priority than cell 1. Cell 1 and cell 2 shall belong to different tracking areas.

**Table A.4.6.2.1.1-1: General Test Parameters for E-UTRAN TDD - lower priority cdma2000 1X Cell Re-selection**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active cell | | Cell 1 | E-UTRAN TDD cell |
| | Neighbour cell | | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell | | Cell 2 | cdma2000 1X cell is selecting during T2 |
| DRX cycle length | | s | 1.28 | |
| E-UTRA TDD RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| E-UTRA TDD Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| cdma2000 1X RF Channel Number | | | 1 | Only one cdma2000 1X carrier frequency is used. |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| E_UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| T1 | | s | 30 | |
| T2 | | s | 30 | |

**Table A.4.6.2.1.1-2: Cell Specific Test Parameters for E-UTRAN TDD (Cell # 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 KHz | -89 | -102 |
| $\hat{E}_s / I_{ot}$ | dB | 9 | -4 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | -4 |
| $Treselection_{EUTRAN}$ | S | 0 | |
| Snonintrasearch | dB | Not sent | |
| cellReselectionPriority | - | 1 | |
| Qrxlevmin | dBm | -140 | |
| Qrxlevminoffset | dB | 0 | |
| Pcompensation | dB | 0 | |
| $S_{ServingCell}$ | dB | 51 | 38 |
| $Thresh_{serving, low}$ | dB | 44 | |
| Propagation Condition | | AWGN | |

Note 1: CNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Iterference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: SRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.4.6.2.1.1-3: Cell Specific Test Parameters for cdma2000 1X (cell # 2)**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| cdma2000 1X RF Channel Number | | 1 | |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | |
| $\hat{I}_{or} / I_{oc}$ | dB | 0 | 0 |
| $I_{oc}$ | dBm/ 1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -10 | -10 |
| Propagation Condition | | AWGN | |
| $S_{nonServingCell,x}$ | | -20 | |
| Treselection | s | 0 | |
| oneXRTT-CellReselectionPriority | - | 0 | |
| $Thresh_{x, low}$ | | -28 | |

### A.4.6.2.1.2 Test Requirements

The cell reselection delay to lower priority is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2 and starts to send access probe preambles on the Access Channel on cell 2.

The cell re-selection delay to the lower priority cell 2 shall be less than 21 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to lower priority cell can be expressed as: $T_{evaluatecdma2000\ 1X} + T_{SI\text{-}cdma2000\ 1X}$

Where:

$T_{evaluatcdma2000\ 1X}$ See Table 4.2.2.5.5-1

$T_{SI\text{-}cdma2000\ 1X}$ Maximum repetition period of relevant system information blocks that need to be received by the UE to camp on cell 2; 1280 ms is assumed in this test case.

This gives a total of 20.48 s for the lower priority cell reselection, allow 21 s in the test case.

## A.4.7 Idle State Positioning Measurement for UE category NB1

### A.4.7.1 HD – FDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage

#### A.4.7.1.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement period for HD-FDD category NB1 UE meets the delay requirements specified in Clause 4.8.2.

In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS36.331 [2].

The test parameters are given in Tables A.4.7.1.1-1 A.4.7.1.1-2 and A.4.7.1.1-3.

**Table A.4.7.1.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |
| Reference cell | | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID | | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>and<br>(nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS36.366 [24] |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 320 | As defined in TS36.355 [24] |
| NPRS muting info | | nCell 1: ‘11110000’<br>nCell 2: ‘00001111’<br>nCell 3: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | N/A | NPRS is configured based on PartB but not PartA. |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1<br>nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | μs | nCell 2: 3<br>nCell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | μs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |

| | | | |
|---|---|---|---|
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 5.12 | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 57 | The length of the time interval that follows immediately after time interval T5 |

**Table A.4.7.1.1-2: Cell-specific test parameters during T1 and T6**

| Parameter | Unit | nCell 1 | nCell 2 | nCell 3 |
|---|---|---|---|---|
| NB-IoT RF Channel Number | | 1 | 1 | 1 |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | kHz | 200 | 200 | 200 |
| OCNG Pattern Note 1 | | NOP.3 FDD | N/A | N/A |
| NPDSCH parameters Note 2 | | R.18 HD-FDD | N/A | N/A |
| NPDCCH parameters Note 2 | | R.30 HD-FDD | N/A | N/A |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | N/A | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | | |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| $\hat{E}_s/N_{oc}$ | dB | -2 | -Infinity | -Infinity |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |
| Timing offset to nCell 1 | μs | N/A | 1 | -1 |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

**Table A.4.7.1.1-3: Cell-specific test parameters from T2 to T5**

| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 |
| $BW_{channel}$ | kHz | 200 | | 200 | | 200 | |
| NB-IoT RF Channel Number | | 1 | | 1 | | 1 | |
| OCNG patterns | | NOP.3 FDD | | N/A | NOP.3 FDD | NOP.3 FDD | N/A |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| NPRS_RA | dB | -3 | N/A | N/A | 0 | 0 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| NPRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| Io Note 4 | dBm/ 180kHz | -87.14 | -87.12 | -87.14 | -87.12 | -87.14 | -87.12 |
| NPRP Note 4 | dBm/ 15 kHz | -113 | -Infinity | -Infinity | -110 | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -107 | -113 | -110 | -113 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -12 | -12 | -15 | -15 | -15 | -Infinity |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 1x1 | | | | | |
| Timing offset to nCell 1 | µs | N/A | | 1 | | -1 | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

## A.4.7.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.2.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within $T_{RSTD_intra_NB\text{-}IoT\text{-}EC} + T_{RandomAccess_NB\text{-}IoT\text{-}EC} = 67.16$ s starting from the

beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell1.

The RSTD measurement time $T_{RSTD_intra_NB\text{-}IoT\text{-}EC}$ in the test is derived according to section 4.8.2. This gives the total RSTD measurement time of 11.52s for Cell 2 and Cell 3 with respect to the reference Cell 1

The random access to an already detected cell $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC} + T_{SI} + T_{PRACH_NB\text{-}IoT}$,

Where:

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

$T_{PRACH_NB\text{-}IoT}$ = 1280 ms; it is the additional delay caused by the random access procedure.

This gives $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ = 55.64 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3 , i.e., between RSTD_0000 and RSTD_12711.

## A.4.7.2 HD – FDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage

### A.4.7.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement period for HD-FDD category NB1 UE meets the delay requirements specified in Clause 4.8.4.

In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC_IDLE state within $\Delta T$ seconds after the receipt of the RRC connection release, where $\Delta T$ = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS36.331 [2].

The test parameters are given in Tables A.4.7.2.1-1 A.4.7.2.1-2 and A.4.7.2.1-3.

**Table A.4.7.2.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |

| | | | |
|---|---|---|---|
| Reference cell | | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID | | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>and<br>(nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS36.366 [24] |
| nprs-period | ms | 640 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 320 | As defined in TS36.355 [24] |
| nprs-SubframeOffset | | 0 | As defined in TS36.355 [24] |
| NPRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | N/A | NPRS is configured based on PartB but not PartA. |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX | | 1.28 | DRX parameters are further specified in Table A.8.12.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | nCell 2 to nCell 1: 1<br>nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 5.12 | The length of the time interval that follows immediately after time interval T4 |

| | | | |
|---|---|---|---|
| T6 | s | ≥ 57 | The length of the time interval that follows immediately after time interval T5 |

**Table A.4.7.2.1-2: Cell-specific test parameters during T1 and T6**

| Parameter | Unit | nCell 1 | nCell 2 | nCell 3 |
|---|---|---|---|---|
| NB-IoT RF Channel Number | | 1 | 2 | 2 |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | KHz | 200 | 200 | 200 |
| OCNG Pattern Note 1 | | NOP.3 FDD | N/A | N/A |
| NPDSCH parameters Note 2 | | R.18 HD-FDD | N/A | N/A |
| NPDCCH parameters Note 2 | | R.30 HD-FDD | N/A | N/A |
| NPBCH_RA | dB | 0 | N/A | N/A |
| NPBCH_RB | | | | |
| NPSS_RA | | | | |
| NSSS_RA | | | | |
| NPDCCH_RA | | | | |
| NPDCCH_RB | | | | |
| NPDSCH_RA | | | | |
| NPDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | | |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| $\hat{E}_s/N_{oc}$ | dB | -2 | -Infinity | -Infinity |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |
| Timing offset to nCell 1 | µs | N/A | 1 | -1 |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

**Table A.4.7.2.1-3: Cell-specific test parameters from T2 to T5**

| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 |
| $BW_{channel}$ | kHz | 200 | | 200 | | 200 | |
| NB-IoT RF Channel Number | | 1 | | 2 | | 2 | |
| NPDSCH parameters Note 2 | | R.18 HD-FDD | | N/A | | N/A | |
| NPDCCH parameters Note 2 | | R.30 HD-FDD | | N/A | | N/A | |
| OCNG patterns | | NOP.3 FDD | | N/A | NOP.3 FDD | NOP.3 FDD | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| NPRS_RA | dB | -3 | N/A | N/A | 0 | 0 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| NPRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| Io Note 4 | dBm/ 180kHz | -87.17 | -87.20 | -87.17 | -87.15 | -87.17 | -87.15 |
| NPRP Note 4 | dBm/ 15 kHz | -113 | -Infinity | -Infinity | -110 | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -113 | -110 | -113 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -12 | -12 | -15 | -15 | -15 | -Infinity |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 1x1 | | | | | |
| Timing offset to nCell 1 | µs | N/A | | 1 | | -1 | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

### A.4.7.4.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.4.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within $T_{RSTD_inter_NB\text{-}IoT\text{-}EC} + T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ = 67.16 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell1.

The RSTD measurement time $T_{RSTD_inter_NB\text{-}IoT\text{-}EC}$ in the test is derived according to section 4.8.4. This gives the total RSTD measurement time of 11.52 s for Cell 2 and Cell 3 with respect to the reference Cell 1.

The random access to an already detected cell $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ can be expressed as: $T_{evaluate,\ NB_inter_NB\text{-}IoT\text{-}EC} + T_{SI} + T_{PRACH_NB\text{-}IoT}$,

Where:

$T_{evaluate,\ NB_inter_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.

$T_{PRACH_NB\text{-}IoT}$ = 1280 ms; it is the additional delay caused by the random access procedure.

This gives $T_{RandomAccess_NB\text{-}IoT}$ =55.64 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

## A.4.7.3 TDD Intra frequency case for UE Category NB1 standalone mode in enhanced coverage

### A.4.7.3.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement period for TDD category NB1 UE meets the delay requirements specified in Clause 4.8.2.In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of six consecutive time intervals, with duration of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with an RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC_IDLE state within $\Delta T$ seconds after the receipt of the RRC connection release, where $\Delta T$ = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS 36.331 [2].

The test parameters are given in Tables A.4.7.3.1-1 A.4.7.3.1-2 and A.4.7.3.1-3.

**Table A.4.7.3.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |
| Reference cell | | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID | | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>and<br>(nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS 36.355 [24] |

| | | | |
|---|---|---|---|
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| NPRS muting info | | nCell 1: '11110000'<br>nCell 2: '00001111'<br>nCell 3: '11110000' | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | N/A | NPRS is configured based on PartB but not PartA. |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Specified in A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | nCell 2 to nCell 1: 1<br>nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | nCell 2: 3<br>nCell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 5.12 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | [5.12] | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 58.2 | The length of the time interval that follows immediately after time interval T5 |

**Table A.4.7.3.1-2: Cell-specific test parameters during T1 and T6**

| Parameter | Unit | nCell 1 | nCell 2 | nCell 3 |
|---|---|---|---|---|
| NB-IoT RF Channel Number | | 1 | 1 | 1 |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | kHz | 200 | 200 | 200 |
| OCNG Pattern Note 1 | | NOP.3 TDD | N/A | N/A |
| NPDSCH parameters Note 2 | | R.18 NB-TDD | N/A | N/A |
| NPDCCH parameters Note 2 | | R.30 NB-TDD | N/A | N/A |
| NPBCH_RA | dB | 0 | N/A | N/A |

| | | | | |
|---|---|---|---|---|
| NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | | |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| $\hat{E}_s/N_{oc}$ | dB | -2 | -Infinity | -Infinity |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |
| Timing offset to nCell 1 | µs | N/A | 1 | -1 |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.<br>Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.<br>Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | |

**Table A.4.7.3.1-3: Cell-specific test parameters from T2 to T5**

| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 |
| $BW_{channel}$ | kHz | 200 | | 200 | | 200 | |
| NB-IoT RF Channel Number | | 1 | | 1 | | 1 | |
| OCNG patterns | | NOP.3 TDD | | N/A | NOP.3 TDD | NOP.3 TDD | N/A |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| NPRS_RA | dB | -3 | N/A | N/A | 0 | 0 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| NPRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| Io Note 4 | dBm/ 180kHz | -87.14 | -87.12 | -87.14 | -87.12 | -87.14 | -87.12 |
| NPRP Note 4 | dBm/ 15 kHz | -113 | -Infinity | -Infinity | -110 | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -107 | -113 | -110 | -113 | -Infinity |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -12 | -12 | -15 | -15 | -15 | -Infinity |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 1x1 | | | | | |
| Timing offset to nCell 1 | µs | N/A | | 1 | | -1 | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

### A.4.7.3.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.2.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within $T_{RSTD_intra_NB\text{-}IoT\text{-}EC} + T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ = 68.44 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell 1.

The RSTD measurement time $T_{RSTD_intra_NB\text{-}IoT\text{-}EC}$ in the test is derived according to section 4.8.2. This gives the total RSTD measurement time of 11.52 s for nCell 2 and nCell 3 with respect to the reference nCell 1.

The random access to an already detected cell $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ can be expressed as: $T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC} + T_{SI} + T_{PRACH_NB\text{-}IoT}$,

Where:

$T_{evaluate,\ NB_intra_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

$T_{PRACH_NB\text{-}IoT}$ = 2560 ms; it is the additional delay caused by the random access procedure.

This gives $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ = 56.92 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

## A.4.7.4 TDD Inter frequency case for UE Category NB1 standalone mode in enhanced coverage

### A.4.7.4.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement period for TDD category NB1 UE meets the delay requirements specified in Clause 4.8.4. In the test there are three synchronous cells: nCell 1, nCell 2 and nCell 3. nCell 1 is the reference cell. nCell 2 and nCell 3 are the neighbour cells.

The test consists of six consecutive time intervals, with durations of T1, T2, T3, T4, T5, and T6. nCell 1 is active throughout T1, T2, T3, T4, T5, and T6, whilst nCell 2 and nCell 3 are activated only in the beginning of T2. nCell 2 is active until the end of T5, and nCell 3 is active until the end of T4. nCell 1 transmits NPRS in T2 and T4, while nCell 2 transmits NPRS in T3 and T5, and nCell 3 transmits NPRS only in T2 and T4. Note: The information on when NPRS is muted is conveyed to the UE using PRS muting information.

Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell 1.

At the start of the time duration T1, the OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. The duration of T1 is sufficiently long to deliver the OTDOA assistance data and *OTDOA-RequestLocationInformation* to the UE and is independent of the delay requirements specified in Clause 4.8.2.

After OTDOA assistance data and *OTDOA-RequestLocationInformation* have been successfully received, the UE is provided with a RRC connection release command. The RRC connection release command shall be received by the UE in the last TTI of interval T1. The UE shall enter RRC_IDLE state within ΔT seconds after the receipt of the RRC connection release, where ΔT = 10s is the maximum delay for NB-IOT UE to perform RRC connection release as define in TS 36.331 [2].

The test parameters are given in Tables A.4.7.4.1-1 A.4.7.4.1-2 and A.4.7.4.1-3.

**Table A.4.7.4.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |
| Reference cell | | nCell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | nCell 2 and nCell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| nprsID | | (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>and<br>(nprsID of Cell 1 – nprsID of Cell 3)mod6=2 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| nprs-SubframeOffset | | 0 | As defined in TS 36.355 [24] |
| NPRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | N/A | NPRS is configured based on PartB but not PartA. |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Refer to A.3.18 |
| DRX | | 1.28 | DRX parameters are further specified in Table A.8.12.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | μs | nCell 2 to nCell 1: 1<br>nCell 3 to nCell 1: -1 | PRS are transmitted from synchronous cells |

| | | | |
|---|---|---|---|
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| T4 | s | 10.24 | The length of the time interval that follows immediately after time interval T3 |
| T5 | s | 10.24 | The length of the time interval that follows immediately after time interval T4 |
| T6 | s | ≥ 58.2 | The length of the time interval that follows immediately after time interval T5 |

**Table A.4.7.4.1-2: Cell-specific test parameters during T1 and T6**

| Parameter | Unit | nCell 1 | nCell 2 | nCell 3 |
|---|---|---|---|---|
| NB-IoT RF Channel Number | | 1 | 2 | 2 |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | KHz | 200 | 200 | 200 |
| OCNG Pattern Note 1 | | NOP.3 TDD | N/A | N/A |
| NPDSCH parameters Note 2 | | R.18 NB-TDD | N/A | N/A |
| NPDCCH parameters Note 2 | | R.30 NB-TDD | N/A | N/A |
| NPBCH_RA | dB | 0 | N/A | N/A |
| NPBCH_RB | | | | |
| NPSS_RA | | | | |
| NSSS_RA | | | | |
| NPDCCH_RA | | | | |
| NPDCCH_RB | | | | |
| NPDSCH_RA | | | | |
| NPDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | | |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| $\hat{E}_s/N_{oc}$ | dB | -2 | -Infinity | -Infinity |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |

| | | | | |
|---|---|---|---|---|
| Timing offset to nCell 1 | µs | N/A | 1 | -1 |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

**Table A.4.7.4.1-3: Cell-specific test parameters from T2 to T5**

| Parameter | Unit | nCell 1 | | nCell 2 | | nCell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 | T2 and T4 | T3 and T5 |
| $BW_{channel}$ | kHz | 200 | | 200 | | 200 | |
| NB-IoT RF Channel Number | | 1 | | 2 | | 2 | |
| NPDSCH parameters Note 2 | | R.18 NB-TDD | | N/A | | N/A | |
| NPDCCH parameters Note 2 | | R.30 NB-TDD | | N/A | | N/A | |
| OCNG patterns | | NOP.3 TDD | | N/A | NOP.3 TDD | NOP.3 TDD | N/A |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| NPRS_RA | dB | -3 | N/A | N/A | 0 | 0 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| NPRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -15 | -Infinity | -Infinity | -15 | -15 | -Infinity |
| Io Note 4 | dBm/ 180kHz | -87.17 | -87.20 | -87.17 | -87.15 | -87.17 | -87.15 |
| NPRP Note 4 | dBm/ 15 kHz | -113 | -Infinity | -Infinity | -110 | -113 | -Infinity |
| NRSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -113 | -110 | -113 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -12 | -12 | -15 | -15 | -15 | -Infinity |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 1x1 | | | | | |
| Timing offset to nCell 1 | µs | N/A | | 1 | | -1 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

#### A.4.7.4.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 4.8.4.

The UE shall perform and report the RSTD measurements for nCell 2 and nCell 3 with respect to the reference cell in the OTDOA assistance data, nCell 1, within $T_{RSTD_inter_NB\text{-}IoT\text{-}EC} + T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ = 78.68 s starting from the beginning of time interval T4, to the moment when the UE starts to send preambles on the PRACH for sending the positioning measurement report message to nCell 1.

The RSTD measurement time $T_{RSTD_inter_NB\text{-}IoT\text{-}EC}$ in the test is derived according to section 4.8.4. This gives the total RSTD measurement time of 21.76 s for nCell 2 and nCell 3 with respect to the reference nCell 1.

The random access to an already detected cell $T_{RandomAccess_NB\text{-}IoT\text{-}EC}$ can be expressed as: $T_{evaluate,\ NB_inter_NB\text{-}IoT\text{-}EC} + T_{SI} + T_{PRACH_NB\text{-}IoT}$,

Where:

$T_{evaluate,\ NB_inter_NB\text{-}IoT\text{-}EC}$ See Table 4.6.2.4-1 in clause 4.6.2.4

$T_{SI}$ = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

$T_{PRACH_NB\text{-}IoT}$ = 2560 ms; it is the additional delay caused by the random access procedure.

This gives $T_{RandomAccess_NB\text{-}IoT}$ =56.92 s for the random access delay to an already detected cell in the test case.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

# A.5 E-UTRAN RRC CONNECTED Mode Mobility

## A.5.1 E-UTRAN Handover

### A.5.1.1 E-UTRAN FDD - FDD Intra frequency handover

#### A.5.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.1.1-1 and A.5.1.1.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.1.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.1.

This gives a total of 50 ms.

## A.5.1.2 E-UTRAN TDD - TDD Intra frequency handover

### A.5.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.2.1-1 and A.5.1.2.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.2.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.2.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.1.

This gives a total of 50 ms.

## A.5.1.3 E-UTRAN FDD – FDD Inter frequency handover

### A.5.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.3.1-1 and A.5.1.3.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

**Table A.5.1.3.1-1: General test parameters for E-UTRAN FDD-FDD Inter frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Inter frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.3.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.1.

This gives a total of 50 ms.

## A.5.1.4 E-UTRAN TDD – TDD Inter frequency handover

### A.5.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables Table A.5.1.4.1-1 and Table A.5.1.4.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3.

**Table A.5.1.4.1-1: General test parameters for E-UTRAN TDD-TDD Inter frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.4.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.1.

This gives a total of 50 ms.

## A.5.1.5 E-UTRAN FDD – FDD Inter frequency handover: unknown target cell

### A.5.1.5.1 Test Purpose and Environment

This test is to verify the FDD-FDD inter-frequency handover requirements for the case when the target cell is unknown as specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.5.1-1 and A.5.1.5.1-2. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and start to transmit the PRACH to Cell 2.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

**Table A.5.1.5.1-1: General test parameters for the E-UTRAN FDD-FDD Inter frequency handover test case when the target cell is unknown**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| DRX | | | OFF | Non-DRX test |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | ≤5 | |
| T2 | | s | 1 | |

**Table A.5.1.5.1-2: Cell specific test parameters for the E-UTRAN FDD-FDD Inter frequency handover test case when the target cell is unknown**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 130 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms, which is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 115 ms in the test. See clause 5.1.2.1.2.1.

This gives a total of 130 ms.

## A.5.1.6 E-UTRAN TDD – TDD Inter frequency handover; unknown Target Cell

### A.5.1.6.1 Test Purpose and Environment

This test is to verify the TDD-TDD inter-frequency handover requirements for the case when the target cell is unknown as specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables A.5.1.6.1-1 and A.5.1.6.1-2. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

**Table A.5.1.6.1-1: General test parameters for the E-UTRAN TDD-TDD Inter-Frequency handover test case when the target cell is unknown**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| Gap pattern configuration | | | - | No gap pattern configured |
| T1 | | s | ≤5 | |
| T2 | | s | 1 | |

**Table A.5.1.6.1-2: Cell specific test parameters for the E-UTRAN TDD-TDD Inter frequency handover test case when the target cell is unknown**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -93 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 5 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -93 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 5 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.6.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 130 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay= 15 ms, which is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 115 ms in the test. See clause 5.2.2.4.2.1.

This gives a total of 130 ms.

# A.5.1.7 E-UTRAN FDD – TDD Inter frequency handover

## A.5.1.7.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter frequency handover requirements specified in clause 5.2.2.2.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA TDD cell as given in tables Table A.5.1.7.1-1 , Table A.5.1.7.1-2 and Table A.5.1.7.1-3. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3.

**Table A.5.1.7.1-1: General test parameters for E-UTRAN FDD-TDD Inter frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One FDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One TDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| CP length | | | Normal | |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 2. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 2 |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.7.1-2: Cell specific test parameters for E-UTRAN FDD (cell #1) in E-UTRAN FDD-TDD Inter frequency handover test case**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

**Table A.5.1.7.1-3: Cell specific test parameters for E-UTRAN TDD (cell #2) in E-UTRAN FDD-TDD Inter frequency handover test case**

| Parameter | Unit | Cell 2 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves. |

### A.5.1.7.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.1.

This gives a total of 50 ms.

## A.5.1.8 E-UTRAN TDD – FDD Inter frequency handover

### A.5.1.8.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency handover requirements specified in clause 5.2.2.3.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA FDD cell as given in tables Table A.5.1.8.1-1, Table A.5.1.8.1-2 and Table A.5.1.8.1-3. PDCCHs indicating new transmissions should be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

**Table A.5.1.8.1-1: General test parameters for E-UTRAN TDD-FDD Inter frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One TDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One FDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |

| | | | |
|---|---|---|---|
| E-UTRA FDD PRACH configuration | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.1.8.1-2: Cell specific test parameters for E-UTRAN TDD (cell #1) in E-UTRAN TDD-FDD Inter frequency handover test case**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

**Table A.5.1.8.1-3: Cell specific test parameters for E-UTRAN FDD (cell #2) in E-UTRAN TDD-FDD Inter frequency handover test case**

| Parameter | Unit | Cell 2 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | | | |
| PBCH_RB | dB | | | |

| | | | | |
|---|---|---|---|---|
| PSS_RA | dB | 0 | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 |
| Propagation Condition | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

### A.5.1.8.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.1.

This gives a total of 50 ms.

## A.5.1.9 E-UTRAN FDD - FDD Intra frequency handover for 5MHz bandwidth

### A.5.1.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.5.1.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.5.1.9.1-1 and A.5.1.9.1-2 will replace the values of corresponding parameters in Tables A.5.1.1.1-1 and A.5.1.1.1-2.

**Table A.5.1.9.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case, 5MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Note 1: See Table A.5.1.1.1-1 for other general test parameters.<br>Note 2: This test is performed according to the principle defined in section A.3.7.2 | | | |

**Table A.5.1.9.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case, 5MHz**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | OP.15 FDD | OP.16 FDD | OP.16 FDD | OP.16 FDD | OP.15 FDD |
| Note 1: See Table A.5.1.1.1-2 for other cell-specific test parameters. | | | | | | | |

### A.5.1.9.2 Test Requirements

The requirements defined in section A.5.1.1.2 shall apply to this test case.

## A.5.1.10 E-UTRAN FDD - FDD Intra frequency handover for UE category 0

### A.5.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.10.1-1 and A.5.1.10.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.10.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.13 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.10.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.10.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.1.

This gives a total of 50 ms.

## A.5.1.11 E-UTRAN HD - FDD Intra frequency handover for UE category 0

### A.5.1.11.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.2.2.5.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.11.1-1 and A.5.1.11.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.11.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.1 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.3 HD-FDD | As specified in clause A.3.1.2.3 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.11.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.5.1.11.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.5.2.1.

This gives a total of 50 ms.

## A.5.1.12 E-UTRAN TDD - TDD Intra frequency handover for UE category 0

### A.5.1.12.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.12.1-1 and A.5.1.12.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.12.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.12 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |

| | | | |
|---|---|---|---|
| PRACH configuration index | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.1.12.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.12.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.1.

This gives a total of 50 ms.

# A.5.1.13 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA

## A.5.1.13.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.5.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.13.1-1 and A.5.1.13.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.13.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.13.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.21 FDD | R.21 FDD | - | - | - | R.21 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.17 FDD | | | R.17 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.13.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

## A.5.1.14 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA

### A.5.1.14.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.5.2.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.14.1-1 and A.5.1.14.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.14.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.14.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 | | R.11 HD-FDD | R.11 HD-FDD | - | - | - | R.11 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.2 | | R.7 HD-FDD | | | R.7 HD-FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ Note 3 | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves

### A.5.1.14.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

## A.5.1.15 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA

### A.5.1.15.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency handover requirements specified in clause 5.5.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.15.1-1 and A.5.1.15.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.15.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| A3-Offset | dB | 0 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | 0 | Specified in the handover message |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.15.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.3 | | R.17 TDD | R.17 TDD | - | - | - | R.17 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.3 | | R.15 TDD | | | R.15 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 | | R.7 TDD | | | R.7 TDD | | |
| OCNG Patterns in clause A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |

| | | | | | |
|---|---|---|---|---|---|
| Io Note 3 | dBm/9MHz | -61.58 | -56.57 | -56.57 | Specified in columns for Cell 1 |
| Propagation Condition | | AWGN | | | AWGN |
| Antenna Configuration | | 2x1 | | | 2x1 |
| Timing offset to Cell 1 Synchronous cells | μs | - | | | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves

### A.5.1.15.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.3.2.

This gives a total of 170 ms.

## A.5.1.16 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB

### A.5.1.16.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements specified in clause 5.6.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.16.1-1 and A.5.1.16.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.16.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |

| | | | |
|---|---|---|---|
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | 0 | Specified in handover message |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 5 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.16.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in A.3.1.4.4 | | R.23 FDD | R.23 FDD | - | - | - | R.23 FDD |
| MPDCCH Reference Channel in A.3.1.3.4 | | R.19 FDD | | | R.19 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.16.2 Test Requirements

The UE shall finish transmission of all repetitions of the PRACH to Cell 2 less than 2610ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610ms.

## A.5.1.17 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB

### A.5.1.17.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements specified in clause 5.6.2.2.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.17.1-1 and A.5.1.17.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.17.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in clause A.3.16 |
| PRACH initial CE level | | | 0 | Specified in handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 5 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.17.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH Reference Channel in clause A.3.1.4.5 | | R.13 HD-FDD | R.13 HD-FDD | - | - | - | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.5 | | R.9 HD-FDD | | | R.9 HD-FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ Note 3 | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

## A.5.1.17.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610ms.

# A.5.1.18 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB

## A.5.1.18.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements specified in clause 5.6.2.3.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.5.1.18.1-1 and A.5.1.18.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.18.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | PRACH_4CE | As specified in clause A.3.16 |
| PRACH initial CE level | | | 0 | Specified in handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 5 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.18.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.6 | | R.19 TDD | R.19 TDD | - | - | - | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.6 | | R.17 TDD | | | R.17 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 | | R.7 TDD | | | R.7 TDD | | |
| OCNG Patterns in clause A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.18.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560ms + 35ms = 2595ms is defined in clause 5.6.2.1.2.

This gives a total of 2610 ms.

## A.5.1.19 E-UTRAN FDD - FDD Intra frequency handover for UE Category 1bis

### A.5.1.19.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements for UE category 1bis specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.19.1-1 and A.5.1.19.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.19.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.19.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Measurement Channel in clause A.3.1.1.1 | | R.0 FDD | R.0 FDD | - | - | - | R.0 FDD |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.6 FDD | | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.1 and in A.3.2.1.2 | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.19.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.

This gives a total of 50 ms.

# A.5.1.20 E-UTRAN TDD - TDD Intra frequency handover for UE Category 1bis

## A.5.1.20.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements for UE category 1bis specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.20.1-1 and A.5.1.20.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.20.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.20.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Measurement Channel in clause A.3.1.1.2 | | R.0 TDD | R.0 TDD | - | - | - | R.0 TDD |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 | | R.6 TDD | | | R.6 TDD | | |
| OCNG Patterns defined in A.3.2.2.1 and in A.3.2.2.2 | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to Cell 1 Asynchronous cells | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.20.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.

This gives a total of 50 ms.

# A.5.1.21 E-UTRAN FDD - FDD Intra frequency RACH-less handover

## A.5.1.21.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency RACH-less handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.21.1-1 and A.5.1.21.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying RACH-less handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.21.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency RACH-less handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 0 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.21.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency RACH-less handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.21.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 30 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.2.

This gives a total of 45 ms.

## A.5.1.22 E-UTRAN TDD - TDD Intra frequency RACH-less handover

### A.5.1.22.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency RACH-less handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.22.1-1 and A.5.1.22.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying RACH-less handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

**Table A.5.1.22.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency RACH-less handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 2 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.22.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency RACH-less handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.22.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 30 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.

This gives a total of 45 ms.

## A.5.1.23 E-UTRAN FDD – FDD Inter frequency RACH-less handover

### A.5.1.23.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency RACH-less handover requirements specified in clause 5.1.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.23.1-1 and A.5.1.23.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying RACH-less handover shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

**Table A.5.1.23.1-1: General test parameters for E-UTRAN FDD-FDD Inter frequency RACH-less handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 0 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.23.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Inter frequency RACH-less handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.23.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 30 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.

This gives a total of 45 ms.

## A.5.1.24 E-UTRAN TDD – TDD Inter frequency RACH-less handover

### A.5.1.24.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter frequency RACH-less handover requirements specified in clause 5.2.2.4.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables Table A.5.1.24.1-1 and Table A.5.1.24.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying RACH-less handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1.

**Table A.5.1.24.1-1: General test parameters for E-UTRAN TDD-TDD Inter frequency RACH-less handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 2 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.24.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter frequency RACH-less handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.5.1.24.2 Test Requirements

The UE shall start to transmit the PUSCH to Cell 2 less than 45 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 30 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.

This gives a total of 45 ms.

## A.5.1.25 E-UTRAN FDD - FDD Intra frequency make-before-break handover

### A.5.1.25.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency make-before-break handover requirements specified in clause 5.1.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.25.1-1 and A.5.1.25.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying make-before-break handover to cell 2. The RRC message implying make-before-break handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying make-before-break handover.

**Table A.5.1.25.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency make-before-break handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.25.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency make-before-break handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.25.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The make-before-break handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.1.2.3.

This gives a total of 50 ms.

The UE shall be scheduled on Cell 1 continuously throughout the test. From the start of T3 until the UE start to transmit the PRACH, at most 5 of all expected ACK/NACKs can be not transmitted by the UE.

Both the rate of correct handovers and the number of not transmitted ACK/NACKs have to be fulfilled simultaneously.

# A.5.1.26 E-UTRAN TDD - TDD Intra frequency make-before-break handover

## A.5.1.26.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency make-before-break handover requirements specified in clause 5.2.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.26.1-1 and A.5.1.26.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send a RRC message implying make-before-break handover to cell 2. The RRC message implying make-before-break handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying make-before-break handover.

**Table A.5.1.26.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency make-before-break handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.5.1.26.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency make-before-break handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.26.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct make-before-break handovers observed during repeated tests shall be at least 90%.

NOTE: The make-before-break handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.2.2.4.2.3.

This gives a total of 50 ms.

The UE shall be scheduled on Cell 1 continuously throughout the test. From the start of T3 until the UE start to transmit the PRACH, at most 3 of all expected ACK/NACKs can be not transmitted by the UE.

Both the rate of correct handovers and the number of not transmitted ACK/NACKs have to be fulfilled simultaneously.

# A.5.1.27 E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA

## A.5.1.27.1 Test Purpose and Environment

This test is to verify the requirement for the FDD inter frequency handover requirements specified in clause 5.5.2.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.27.1-1 and A.5.1.27.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.27.1-1: General test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.27.1-2: Cell specific test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.21 FDD | R.21 FDD | - | - | - | R.21 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.17 FDD | | | R.17 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | -94 | -94 |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | -64.76 | -64.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.27.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

## A.5.1.28 E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA

### A.5.1.28.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency handover requirements specified in clause 5.5.2.2.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.28.1-1 and A.5.1.28.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The

*field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.28.1-1: General test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.28.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.11 HD-FDD | R.11 HD-FDD | - | - | - | R.11 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.7 HD-FDD | | | R.7 HD-FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | -94 | -94 |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | -64.76 | -64.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.28.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

## A.5.1.29 E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA

### A.5.1.29.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency handover requirements specified in clause 5.5.2.3.

The test scenario comprises of two E-UTRA TDD carriers and one cell in each carrier as given in tables A.5.1.29.1-1 and A.5.1.29.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.29.1-1: General test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |

| | | | |
|---|---|---|---|
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | 0 | Specified in the handover message |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.29.1-2: Cell specific test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeA test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.17 TDD | R.17 TDD | - | - | - | R.17 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.15 TDD | | | R.15 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 TDD | | | R.7 TDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -3 | -3 | -3 | -Infinity | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -101 | -101 | -101 | -Infinity | -94 | -94 |
| Io Note 3 | dBm/9MHz | -68.45 | -68.45 | -68.45 | -Infinity | -64.76 | -64.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |

| | | | |
|---|---|---|---|
| Timing offset to Cell 1 Synchronous cells | us | - | 3 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

### A.5.1.29.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 170 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 120 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 170 ms.

## A.5.1.30 E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB

### A.5.1.30.1 Test Purpose and Environment

This test is to verify the requirement for the FDD inter frequency handover requirements specified in clause 5.5.3.1.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.30.1-1 and A.5.1.30.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.30.1-1: General test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.30.1-2: Cell specific test parameters for E-UTRAN FDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4 | | R.23 FDD | R.23 FDD | - | - | - | R.21 FDD |
| MPDCCH Reference Channel in clause A.3.1.3 | | R.19 FDD | | | R.17 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -102 | -102 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | -68.76 | -68.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.30.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

## A.5.1.31 E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB

### A.5.1.31.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD inter frequency handover requirements specified in clause 5.5.3.2.

The test scenario comprises of two E-UTRA FDD carriers and one cell in each carrier as given in tables A.5.1.31.1-1 and A.5.1.31.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.31.1-1: General test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two FDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.31.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4 | | R.13 HD-FDD | R.13 HD-FDD | - | - | - | R.11 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3 | | R.9 HD-FDD | | | R.7 HD-FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -102 | -102 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | -68.76 | -68.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Asynchronous cells | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

## A.5.1.31.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

# A.5.1.32 E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB

## A.5.1.32.1 Test Purpose and Environment

This test is to verify the requirement for the TDD inter frequency handover requirements specified in clause 5.5.3.3.

The test scenario comprises of two E-UTRA TDD carriers and one cell in each carrier as given in tables A.5.1.32.1-1 and A.5.1.32.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. The RRC message implying handover to Cell 2 shall be sent to the UE during period T2, after the UE has reported Event A3. The *field sameSFN-Indication* is not included in the handover command. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

During the test, UE is configured with measurement gap to enable inter-frequency monitoring.

**Table A.5.1.32.1-1: General test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1, 2 | Two TDD carriers are used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.32.1-2: Cell specific test parameters for E-UTRAN TDD inter frequency handover for Cat-M1 UEs in CEModeB test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.19 TDD | R.19 TDD | - | - | - | R.17 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.17 TDD | | | R.15 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 TDD | | | R.7 TDD | | |

| OCNG Patterns in clause A.3.2.1 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -12 | -Infinity | -4 | -4 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -102 | -102 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -69.95 | -Infinity | -68.76 | -68.76 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.32.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 2610 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 2560 + 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 2610 ms.

## A.5.1.33 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

### A.5.1.33.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.33.1-1 and A.5.1.33.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.33.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.33.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.21 FDD | R.21 FDD | - | - | - | R.21 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.17 FDD | | | R.17 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.33.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 50 ms.

## A.5.1.34 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

### A.5.1.34.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.2.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.34.1-1 and A.5.1.34.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.34.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in the handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.34.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 | | R.11 HD-FDD | R.11 HD-FDD | - | - | - | R.11 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.2 | | R.7 HD-FDD | | | R.7 HD-FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ Note 3 | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | - 56.57 | - 56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | | | | |
| Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | |

### A.5.1.34.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 50 ms.

## A.5.1.35 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

### A.5.1.35.1 Test Purpose and Environment

This test is to verify the requirement for the TDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.2.3.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.35.1-1 and A.5.1.35.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.35.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |

| | | | |
|---|---|---|---|
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | 0 | Specified in the handover message |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.35.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.3 | | R.17 TDD | R.17 TDD | - | - | - | R.17 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.3 | | R.15 TDD | | | R.15 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 | | R.7 TDD | | | R.7 TDD | | |
| OCNG Patterns in clause A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 12 | 12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | -4.27 | -4.27 | -Infinity | 3.36 | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -86 | -86 |
| Io Note 3 | dBm/9MHz | -61.58 | -56.57 | -56.57 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | μs | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves |

### A.5.1.35.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35 ms in the test; $T_{interrupt}$ is defined in clause 5.5.2.1.2.

This gives a total of 50 ms.

## A.5.1.36 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

### A.5.1.36.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.1.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.36.1-1 and A.5.1.36.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.36.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in A.3.16 |
| PRACH initial CE level | | | 0 | Specified in handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |

| | | | |
|---|---|---|---|
| T3 | s | 5 | |
| Gap pattern ID | | 1 | |

**Table A.5.1.36.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in A.3.1.4.4 | | R.23 FDD | R.23 FDD | - | - | - | R.23 FDD |
| MPDCCH Reference Channel in A.3.1.3.4 | | R.19 FDD | | | R.19 FDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.1 | | R.7 FDD | | | R.7 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

## A.5.1.36.2 Test Requirements

The UE shall finish transmission of all repetitions of the PRACH to Cell 2 less than 50ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50ms.

# A.5.1.37 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

## A.5.1.37.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.2.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.5.1.37.1-1 and A.5.1.37.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.37.1-1: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | PRACH_4CE | As specified in clause A.3.16 |
| PRACH initial CE level | | | 0 | Specified in handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 5 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.37.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.5 | | R.13 HD-FDD | R.13 HD-FDD | - | - | - | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.5 | | R.9 HD-FDD | | | R.9 HD-FDD | | |

| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.3 | | R.4 HD-FDD | | | R.4 HD-FDD | | |
|---|---|---|---|---|---|---|---|
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ Note 3 | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | us | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.37.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50ms.

## A.5.1.38 E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition

### A.5.1.38.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover requirements without SFN acquisition specified in clause 5.5.3.3.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.5.1.38.1-1 and A.5.1.38.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

During period T2, the UE should report Event A3, and afterwards E-UTRAN shall send a RRC message to the UE implying handover to Cell 2. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. During T3 is defined as the end of the last TTI containing the RRC message from UE implying handover.

During the test, the UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

**Table A.5.1.38.1-1: General test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | PRACH_4CE | As specified in clause A.3.16 |
| PRACH initial CE level | | | 0 | Specified in handover message |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 5 | |
| Gap pattern ID | | | 1 | |

**Table A.5.1.38.1-2: Cell specific test parameters for E-UTRAN TDD Intra frequency handover for Cat-M1 UEs in CEModeB without SFN acquisition test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.6 | | R.19 TDD | R.19 TDD | - | - | - | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.6 | | R.17 TDD | | | R.17 TDD | | |
| PCFICH/PDCCH/PHICH Reference Channel in clause A.3.1.2.2 | | R.7 TDD | | | R.7 TDD | | |
| OCNG Patterns in clause A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 | -Infinity | -7 | -7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.79 | -12.79 | -Infinity | -7.27 | -7.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -110 | -Infinity | -105 | -105 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.21 | -69.21 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 Synchronous cells | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

### A.5.1.38.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt}$ = 35ms is defined in clause 5.6.2.1.2.

This gives a total of 50 ms.

## A.5.1.39 E-UTRAN FDD - FDD Intra frequency handover with direct SCell activation

### A.5.1.39.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover with direct SCell activation requirements specified in subclause 7.7.19.

The test scenario comprises of two E-UTRA FDD carriers and 2 cells as given in tables A.5.1.39.1-1 and A.5.1.39.1-2. The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command that also activates SCell1 (Cell2). This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m + $N_{direct}$).

Time period T3 starts at (m + $N_{direct}$), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

**Table A.5.1.39.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency handover with direct SCell activation test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | SCell1 | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | SCell1 | | Cell 2 | Cell 2 is on RF channel number 2 |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| DRX | | | - | OFF |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 [16] |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | - | Intra-cell handover, no offset |
| T1 | | s | 1 | |
| T2 | | ms | $N_{direct}$ | |
| T3 | | s | 1 | |

**Table A.5.1.39.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover with direct SCell activation test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.39.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe m+*Ndirect*.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: The SCell activation delay, $N_{direct}$, can be expressed as: $N_{direct} = T_{RRC_process} + T_{interrupt} + T_{IU} + T_2 + T_3 + T_{interupt_window} + T_{time_direct}$, where:

$T_{RRC_Process}$ is the RRC procedure delay = 20 ms which is the RRC procedure delay defined for SCell addition in clause 11.2 of TS 36.331 [2],

$T_{interrupt}$ is the interruption time as defined in subclause 5.1.2.1.2,

$T_2$ is the delay for obtaining a valid TA command for the target PCell from the target PCell and the scheduling grant for sending valid CSI report in the target PCell. $T_2$ is up to [13] subframes,

$T_3$ is the delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to 6 subframes,

$T_{interupt_window}$ is the interruption window which is 5ms for FDD and

$T_{time_direct}$ is the direct SCell activation delay. If the SCell is known, then $T_{time_direct}$ is 20 ms. If the SCell is unknown, then $T_{time_direct}$ is 30 ms provided the SCell can be successfully detected on the first attempt.

This gives a total of $N_{direct}$ = 65 + $T_{IU}$ + $T_2$ + $T_3$ ms = 65 + 10 + 13 + 6 = 94 ms.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

## A.5.1.40 E-UTRAN TDD - TDD Intra frequency handover with direct SCell activation

### A.5.1.40.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency handover with direct SCell activation requirements specified in subclause 7.7.19.

The test scenario comprises of two E-UTRA TDD carriers and 2 cells as given in tables A.5.1.40.1-1 and A.5.1.40.1-2. The test consists of three successive time periods, with time durations of T1, T2, and T3 respectively.

At the start of time duration T1, the UE is in connected mode with PCell and SCell1 (cell 2) is in activated state and UE is reporting CQI for both PCell and SCell1.

Time period T2 starts when UE receives a handover command that also activates SCell1 (Cell2). This is done using an *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m+ $N_{direct}$).

Time period T3 starts at (m+ $N_{direct}$), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

**Table A.5.1.40.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | SCell1 | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | SCell1 | | Cell 2 | Cell 2 is on RF channel number 2 |
| E-UTRA RF Channel Number | | | 1,2 | Two TDD carriers are used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| DRX | | | - | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 [16] |
| Time offset between cells | | | - | Intra-cell handover, no offset |
| T1 | | s | 1 | |
| T2 | | s | $N_{direct}$ | |
| T3 | | s | 1 | |

**Table A.5.1.40.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency handover test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.40.2 Test Requirements

The UE shall be capable to transmit valid CSI report for the directly activated SCell1 no later than in subframe m+*Ndirect*.

The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

NOTE: The SCell activation delay, $N_{direct}$, can be expressed as: $N_{direct} = T_{RRC_process} + T_{interrupt} + T_{IU} + T_2 + T_3 + T_{interupt_window} + T_{time_direct}$, where:

$T_{RRC_Process}$ is the RRC procedure delay = 20 ms which is the RRC procedure delay defined for SCell addition in clause 11.2 of TS 36.331 [2],

$T_{interrupt}$ is the interruption time as defined in subclause 5.1.2.1.2,

$T_2$ is the delay for obtaining a valid TA command for the target PCell from the target PCell and the scheduling grant for sending valid CSI report in the target PCell. $T_2$ is up to [13] subframes,

$T_3$ is the delay for applying the received TA for uplink transmission in the target PCell, and greater than or equal to 6 subframes,

$T_{interupt_window}$ is the interruption window which is 7 ms for TDD and

$T_{time_direct}$ is the direct SCell activation delay. If the SCell is known, then $T_{time_direct}$ is 20 ms. If the SCell is unknown, then $T_{time_direct}$ is 30 ms provided the SCell can be successfully detected on the first attempt.

This gives a total of $N_{direct}$ = 67 + $T_{IU}$+ $T_2$ + $T_3$ ms = 67 + 10 + 13 + 6 = 96 ms.

During T3 the UE shall send valid CSI reports for PCell and SCell1 with non-zero CQI index and continue to send CSI reports for PCell and SCell1 (Cell 2) with non-zero CQI index until the end of T3.

All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct.

## A.5.1.41 E-UTRAN FDD – FDD Intra-band Inter-frequency sync DAPS handover

### A.5.1.41.1 Test Purpose and Environment

This test is to verify the requirement for the FDD – FDD Intra-band Inter-frequency sync DAPS handover specified in clause 5.7.2.1. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA FDD cell on the same band as given in tables Table A.5.1.41.1-1 and Table A.5.1.41.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.41.1-1: General test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers on the same band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |

| | | | |
|---|---|---|---|
| PRACH configuration | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | 6 μs | synchronous cells |
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| T4 | ms | 100 | |
| T5 | ms | 100 | |

**Table A.5.1.41.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.41.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 5ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 20ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 5ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 5 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 20 ms.

# A.5.1.42 E-UTRAN FDD – FDD Intra-band Inter-frequency async DAPS handover

## A.5.1.42.1 Test Purpose and Environment

This test is to verify the requirement for the FDD – FDD Intra-band Inter-frequency async DAPS handover specified in clause 5.7.2.1. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA FDD cell on the same band as given in tables Table A.5.1.42.1-1 and Table A.5.1.42.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.42.1-1: General test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency async DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers on the same band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 3ms | asynchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 100 | |
| T5 | | ms | 100 | |

**Table A.5.1.42.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency async DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.42.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 6ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 21ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 6ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 6 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 21 ms.

# A.5.1.43 E-UTRAN FDD – FDD Inter-band Inter-frequency sync DAPS handover

## A.5.1.43.1 Test Purpose and Environment

This test is to verify the requirement for the FDD – FDD Inter-band Inter-frequency sync DAPS handover specified in clause 5.7.2.1. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA FDD cell on the different band as given in tables Table A.5.1.43.1-1 and Table A.5.1.43.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.43.1-1: General test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers on the different band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 33 μs | synchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 100 | |
| T5 | | ms | 100 | |

**Table A.5.1.43.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.43.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T2. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 1ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 16ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 1ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 1 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 16 ms.

# A.5.1.44 E-UTRAN FDD – FDD Inter-band Inter-frequency async DAPS handover

## A.5.1.44.1 Test Purpose and Environment

This test is to verify the requirement for the FDD – FDD Inter-band Inter-frequency async DAPS handover specified in clause 5.7.2.1. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA FDD cell on the different band as given in tables Table A.5.1.44.1-1 and Table A.5.1.44.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.44.1-1: General test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency async DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers on the different band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 3ms | asynchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 100 | |
| T5 | | ms | 100 | |

**Table A.5.1.44.1-2: Cell specific test parameters for E-UTRAN FDD – FDD Intra-band Inter-frequency async DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.44.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 2ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 17ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 2ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 2 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 17 ms.

# A.5.1.45 E-UTRAN FDD - FDD Intra frequency DAPS handover

## A.5.1.45.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency DAPS handover requirements specified in clause 5.7.2.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.45.1-1 and A.5.1.45.1-2. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

Cell 1 shall send a RRC message implying DAPS handover to cell 2. The RRC message implying target cell add shall be sent to the UE during period T2, after the UE has reported Event A3. The start of time duration T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover.

During period T3, UE shall be able to perform random access to cell 2. DL scheduling and UL feedback to cell 1 shall be avoided during the random access procedure to cell 2. After successful random access procedure to cell 2, UE is scheduled with PDSCH from cell 1 and cell 2 in alternative TTIs where cell 1 and cell 2 belong to the same TAG.

Cell 2 shall send another RRC message implying source cell release. The RRC message implying source cell release shall be sent to the UE during period T3, after the UE has successfully sent PRACH to cell 2. The start of the time duration T4 is defined as the end of the last TTI containing the RRC message implying source cell release.

UE shall stop periodic reporting of CSI to cell 1 during T5.

**Table A.5.1.45.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | $10 + D_{Handover2}$ | $D_{Handover2}$ is defined in clause 5.7.2.1.2 |
| T5 | | ms | 100 | |

**Table A.5.1.45.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | | | OP.2 FDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -1.5 | -1.5 | -1.5 | -1.5 | -Infinity | 0.36 | 0.36 | 0.36 | 0.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 9 | 9 | 9 | 9 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -Infinity | -89 | -89 | -89 | -89 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.45.1 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $D_{handover1}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$D_{handover1}$ = 35 and is defined in clause 5.7.2.1.1.

This gives a total of 50 ms.

During $D_{handover1}$, the UE is allowed an interruption of up to $T_{interrupt1}$ on cell 1. $T_{interrupt1}$ is defined in clause 5.7.2.1.2.

After successful RACH to cell 2 and until the start of time period T4, UE shall be able to successfully receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 2 less than $D_{handover2}$ from the beginning of time period T4. $D_{handover2}$ is defined in clause 5.7.2.1.2.

During $D_{handover2}$, the UE is allowed an interruption of up to $T_{interrupt2}$ on cell 2. $T_{interrupt2}$ is defined in clause 5.7.2.1.2. UE shall not report CSI to cell 1 during T5.

# A.5.1.46 E-UTRAN TDD - TDD Intra frequency DAPS handover

## A.5.1.46.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency DAPS handover requirements specified in clause 5.7.2.4.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.46.1-1 and A.5.1.46.1-2. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

Cell 1 shall send a RRC message implying DAPS handover to cell 2. The RRC message implying target cell add shall be sent to the UE during period T2, after the UE has reported Event A3. The start of time duration T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover.

During period T3, UE shall be able to perform random access to cell 2. DL scheduling and UL feedback to cell 1 shall be avoided during the random access procedure to cell 2. After successful random access procedure to cell 2, UE is scheduled with PDSCH from cell 1 and cell 2 in alternative TTIs where cell 1 and cell 2 belong to the same TAG.

Cell 2 shall send another RRC message implying source cell release. The RRC message implying source cell release shall be sent to the UE during period T3, after the UE has successfully sent PRACH to cell 2. The start of the time duration T4 is defined as the end of the last TTI containing the RRC message implying source cell release.

UE shall stop periodic reporting of CSI to cell 1 during T5.

**Table A.5.1.46.1-1: General test parameters for E-UTRAN TDD-TDD Intra frequency DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 10 + $D_{Handover2}$ | $D_{Handover2}$ is defined in clause 5.7.2.1.2 |
| T5 | | ms | 100 | |

**Table A.5.1.46.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Intra frequency DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | | | OP.2 TDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -1.5 | -1.5 | -1.5 | 1.5 | -Infinity | 0.36 | 0.36 | 0.36 | 0.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 9 | 9 | 9 | 9 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | - Infinity | -89 | -89 | -89 | -89 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.46.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $D_{handover1}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$D_{handover1}$ = 35 and is defined in clause 5.7.2.1.1.

This gives a total of 50 ms.

During $D_{handover1}$, the UE is allowed an interruption of up to $T_{interrupt1}$ on cell 1. $T_{interrupt1}$ is defined in clause 5.7.2.1.2.

After successful RACH to cell 2 and until the start of time period T4, UE shall be able to successfully receive PDSCH alternatively from cell 1 and cell 2. UE is not expected to transmit UL to both cell 1 and cell 2 in the same TTI.

The UE shall release cell 2 less than $D_{handover2}$ from the beginning of time period T4. $D_{handover2}$ is defined in clause 5.7.2.1.2.

During $D_{handover2}$, the UE is allowed an interruption of up to $T_{interrupt2}$ on cell 2. $T_{interrupt2}$ is defined in clause 5.7.2.1.2. UE shall not report CSI to cell 1 during T5.

# A.5.1.47 E-UTRAN FDD - FDD Intra frequency conditional handover

## A.5.1.47.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency conditional handover requirements specified in clause 5.1.2.6.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.5.1.47.1-1 and A.5.1.47.1-2. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.47.1-1: General test parameters for E-UTRAN FDD-FDD intra frequency conditional handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.47.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency conditional handover test case**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 8 | -3.3 | -Infinity | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 8 | 8 | - Infinity | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | - Infinity | -87 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.47.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 860 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 800 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

# A.5.1.48 E-UTRAN TDD - TDD Intra frequency conditional handover

## A.5.1.48.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD intra frequency conditional handover requirements specified in clause 5.1.2.9.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.5.1.48.1-1 and A.5.1.48.1-2. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.48.1-1: General test parameters for E-UTRAN TDD-TDD intra frequency conditional handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.48.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra frequency conditional handover test case**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 8 | -3.3 | -Infinity | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 8 | 8 | -Infinity | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | - Infinity | -87 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.48.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 860 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 800 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

# A.5.1.49 E-UTRAN FDD - FDD Inter frequency conditional handover

## A.5.1.49.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD inter-frequency conditional handover requirements specified in clause 5.1.2.6.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.5.1.49.1-1 and A.5.1. 49.1-2. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.49.1-1: General test parameters for E-UTRAN FDD-FDD Inter frequency conditional handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two FDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.49.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.49.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 3900 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 3840 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

# A.5.1.50 E-UTRAN TDD - TDD Inter frequency conditional handover

## A.5.1.50.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-TDD inter-frequency conditional handover requirements specified in clause 5.1.2.9.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables A.5.150.1-1 and A.5.1. 50.1-2. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.50.1-1: General test parameters for E-UTRAN TDD-TDD Inter frequency conditional handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final conditions | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.50.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s/I_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -infinity | -91 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.50.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 3900 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 3840 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

# A.5.1.51 E-UTRAN FDD - TDD Inter frequency conditional handover

## A.5.1.51.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-frequency conditional handover requirements specified in clause 5.1.2.7.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA TDD cell as given in tables A.5.1.51.1-1, A.5.1. x+4.1-2 and A.5.1. 51.1-3. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.51.1-1: General test parameters for E-UTRAN FDD-TDD Inter frequency conditional handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One FDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One TDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | OFF | |
| CP length | | | Normal | |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 2. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 2 |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.51.1-2: Cell specific test parameters for E-UTRAN FDD (cell #1) in E-UTRAN FDD-TDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 |
| Propagation Condition | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

**Table A.5.1.51.1-3: Cell specific test parameters for E-UTRAN TDD (cell #2) in E-UTRAN FDD-TDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 2 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |

| | | | |
|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | dB | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 |
| Propagation Condition | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

### A.5.1.51.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 3900 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 3840 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

## A.5.1.52 E-UTRAN TDD - FDD Inter frequency conditional handover

### A.5.152.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-frequency conditional handover requirements specified in clause 5.1.2.8.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA FDD cell as given in tables A.5.1.52.1-1, A.5.1. 52.1-2 and A.5.1. x+5.1-3. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

E-UTRAN shall send an RRC message implying conditional handover to cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than $T_{RRC}$ before the beginning of T2. At the start of T2, cell 2 becomes detectable and meets the handover condition.

**Table A.5.1.52.1-1: General test parameters for E-UTRAN TDD-FDD Inter frequency conditional handover test case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Cell 1 PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |

| | | | | |
|---|---|---|---|---|
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One TDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One FDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | OFF | |
| CP length | | | Normal | |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤2 | |

**Table A.5.1.52.1-2: Cell specific test parameters for E-UTRAN TDD (cell #1) in E-UTRAN TDD-FDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 |
| Propagation Condition | | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves. |

**Table A.5.1.52.1-3: Cell specific test parameters for E-UTRAN FDD (cell #2) in E-UTRAN TDD-FDD Inter frequency conditional handover test case**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 2 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 |
| Propagation Condition | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

## A.5.1.52.2 Test Requirements

$T_{RRC} + T_{Event_DU}$ occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than $T_{measure} + T_{interrupt} + T_{CHO_execution}$ = 3900 ms from the start of T2 and interruption during T2 shall not exceed 50ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: $T_{RRC} + T_{DelayUncertainty} + T_{measure} + T_{CHO_execution} + T_{interrupt}$, where:

$T_{RRC}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{measure}$ = 3840 ms in the test; $T_{measure}$ is defined in clause 5.1.2.6.2 without $T_{DelayUncertainty}$.

$T_{CHO_execution}$ = 10 ms in the test; $T_{CHO_execution}$ is defined in clause 5.1.2.6.3.

$T_{interrupt}$ = 50 ms in the test; $T_{interrupt}$ is defined in clause 5.1.2.6.4.

# A.5.1.53 E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover

## A.5.1.53.1 Test Purpose and Environment

This test is to verify the requirement for the TDD – TDD Intra-band Inter-frequency sync DAPS handover specified in clause 5.7.2.4. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA TDD cell on the same band as given in tables Table A.5.1.53.1-1 and Table A.5.1.53.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

**Table A.5.1.53.1-1: General test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers on the same band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | For both cell1 and cell2.<br>As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | For both cell1 and cell2.<br>As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 6 μs | synchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| T4 | ms | 20 | |
| T5 | ms | 100 | |

**Table A.5.1.53.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -91 | -91 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.53.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 5ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 20ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 5ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 5 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 20 ms.

# A.5.1.54 E-UTRAN TDD – TDD Inter-band Inter-frequency sync DAPS handover

## A.5.1.54.1 Test Purpose and Environment

This test is to verify the requirement for the TDD – TDD Inter-band Inter-frequency sync DAPS handover specified in clause 5.7.2.4. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA TDD cell on the different band as given in tables Table A.5.1.54.1-1 and Table A.5.1.54.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

**Table A.5.1.54.1-1: General test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | Two TDD carriers on the different band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | Db | -4 | |
| Hysteresis | | Db | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| CP Length | | | Normal | |
| Special subframe configuration | | | 6 | For both cell1 and cell2.<br>As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | For both cell1 and cell2.<br>As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 33 μs | synchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| T4 | ms | 20 | |
| T5 | ms | 100 | |

**Table A.5.1.54.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -91 | -91 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.54.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T2. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 1ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 16ms (($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 1ms ($T_{interrupt2}$).
The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 1 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 16 ms.

# A.5.1.55 E-UTRAN FDD - TDD inter-band inter-frequency synchronous DAPS handover

## A.5.1.55.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-TDD inter-band inter-frequency synchronous DAPS handover requirements specified in clause 5.7.2.2.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA TDD cell as given in tables A.5.1.55.1-1, A.5.1.55.1-2 and A.5.1.55.1-3. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

At the start of time duration T1, the UE does not have any timing information of Cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

Starting T2, Cell 2 becomes detectable. During T2, the UE performs cell detection and measurements on Cell 2 and shall send event report to the network. After receiving the event report A3, the test system should send an RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover command is sent to the UE. During T3, UE should be continuously scheduled on Cell 1 and shall perform random access to Cell 2. DL scheduling and UL feedback to Cell 1 should be avoided when UE is required to perform DL reception or UL transmission in Cell 2, except preamble transmission. After successful RACH procedure in Cell 2 is completed, the test system should send an RRC message implying Cell 1 release command.

The start of T4 is the instant when the last TTI containing the RRC message implying Cell 1 release command is sent to the UE. During T4, the UE shall accomplish the release actions within $D_{handover2}$.

Starting T5, the UE shall stop to send CSI report to Cell 1.

**Table A.5.1.55.1-1: General test parameters for E-UTRAN FDD-TDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One FDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One TDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | OFF | |
| CP length | | | Normal | |
| E-UTRA TDD Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 2. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 2 |
| E-UTRA TDD PRACH configuration | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |

| | | | |
|---|---|---|---|
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | 33μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| T4 | ms | 16 | |
| T5 | ms | 100 | |

**Table A.5.1.55.1-2: Cell specific test parameters for E-UTRAN FDD (Cell 1) in E-UTRAN FDD-TDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

**Table A.5.1.55.1-3: Cell specific test parameters for E-UTRAN TDD (Cell 2) in E-UTRAN FDD-TDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | Unit | Cell 2 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | 7 | 7 | 7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

### A.5.1.55.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $D_{handover1}$ = 65 ms from the start of T3 and interruption on Cell 1 during T3 shall not exceed $T_{interrupt1}$ = 1ms.

The UE shall complete to release Cell 1 less than $D_{handover2}$ = 16 ms from the start of T4 and interruption on Cell 2 during T4 shall not exceed $T_{interrupt2}$ = 1ms.

The rate of correct DAPS handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC_procedure} + T_{search} + T_{IU}$ + 20ms, and $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

$T_{RRC_procedure}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{search}$ = 0 ms in the test as it is assumed as known cell; $T_{search}$ is defined in clause 5.7.2.1.1.

$T_{IU}$ = 30 ms in the test; $T_{CHO_execution}$ is defined in clause 5.7.2.1.1.

$T_{interrupt1}$ = 1 ms in the test; $T_{interrupt}$ is defined in clause 5.7.2.1.2.

$T_{interrupt2}$ = 1 ms in the test; $T_{interrupt}$ is defined in clause 5.7.2.1.2.

This gives a total of 65 ms for $D_{handover1}$ and 16 ms for $D_{handover2}$.

The UE shall not transmit CSI reports on Cell 1 after T5.

## A.5.1.56 E-UTRAN TDD - FDD inter-band inter-frequency synchronous DAPS handover

### A.5.1.56.1 Test Purpose and Environment

This test is to verify the requirement for the TDD-FDD inter-band inter-frequency synchronous DAPS handover requirements specified in clause 5.7.2.3.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA FDD cell as given in tables A.5.1.56.1-1, A.5.1.56.1-2 and A.5.1.56.1-3. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

At the start of time duration T1, the UE does not have any timing information of Cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

Starting T2, Cell 2 becomes detectable. During T2, the UE performs cell detection and measurements on Cell 2 and shall send event report to the network. After receiving the event report A3, the test system should send an RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover command is sent to the UE. During T3, UE should be continuously scheduled on Cell 1 and should be able to perform random access to Cell 2. DL scheduling and UL feedback to Cell 1 should be avoided when UE is required to perform DL reception or

UL transmission in Cell 2, except preamble transmission. After successful RACH procedure of Cell 2 is completed, the test system should send an RRC message implying Cell 1 release command.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover command is sent to the UE. During T3, UE should be continuously scheduled on Cell 1 and shall perform random access to Cell 2. DL scheduling and UL feedback to Cell 1 should be avoided when UE is required to perform DL reception or UL transmission in Cell 2, except preamble transmission. After successful RACH procedure in Cell 2 is completed, the test system should send an RRC message implying Cell 1 release command.

The start of T4 is the instant when the last TTI containing the RRC message implying Cell 1 release command is sent to the UE. During T4, the UE shall accomplish the release actions within $D_{handover2}$.

Starting T5, the UE should stop to send CSI report to Cell 1.

**Table A.5.1.56.1-1: General test parameters for E-UTRAN TDD-FDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Cell 2 PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Cell 1 E-UTRA RF channel number | | | 1 | One TDD carrier is used |
| Cell 2 E-UTRA RF channel number | | | 2 | One FDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| DRX | | | OFF | |
| CP length | | | Normal | |
| E-UTRA FDD PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| E-UTRA FDD Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| Time offset between cells | | | 33μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 16 | |
| T5 | | ms | 100 | |

**Table A.5.1.56.1-2: Cell specific test parameters for E-UTRAN TDD (Cell 1) in E-UTRAN TDD-FDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| SSS_RA | dB | 0 | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | | | |
| Propagation Condition | | AWGN | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

**Table A.5.56.1-3: Cell specific test parameters for E-UTRAN FDD (Cell 2) in E-UTRAN TDD-FDD inter-band inter-frequency synchronous DAPS handover test case**

| Parameter | Unit | Cell 2 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -Infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameter themselves.

## A.5.1.56.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than $D_{handover1}$ = 65 ms from the start of T3 and interruption on Cell 1 during T3 shall not exceed $T_{interrupt1}$ = 1ms.

The UE shall complete to release Cell 1 less than $D_{handover2}$ = 16 ms from the start of T4 and interruption on Cell 2 during T4 shall not exceed $T_{interrupt2}$ = 1ms.

The rate of correct DAPS handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $T_{RRC_procedure} + T_{search} + T_{IU}$ + 20ms, and $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

$T_{RRC_procedure}$ = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{search}$ = 0 ms in the test as it is assumed as known cell; $T_{search}$ is defined in clause 5.7.2.1.1.

$T_{IU}$ = 30 ms in the test; $T_{CHO_execution}$ is defined in clause 5.7.2.1.1.

$T_{interrupt1}$ = 1 ms in the test; $T_{interrupt}$ is defined in clause 5.7.2.1.2.

$T_{interrupt2}$ = 1 ms in the test; $T_{interrupt}$ is defined in clause 5.7.2.1.2.

This gives a total of 65 ms for $D_{handover1}$ and 16 ms for $D_{handover2}$.

The UE shall not transmit CSI reports on Cell 1 after T5.

# A.5.1.57 E-UTRAN FDD – TDD Inter-band Inter-frequency async DAPS handover

## A.5.1.57.1 Test Purpose and Environment

This test is to verify the requirement for the FDD – TDD Inter-band Inter-frequency async DAPS handover specified in clause 5.7.2.2. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA FDD cell and one E-UTRA TDD cell on the different band as given in tables Table A.5.1.57.1-1 and Table A.5.1.57.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.57.1-1: General test parameters for E-UTRAN FDD – TDD Intra-band Inter-frequency async DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | FDD and TDD carriers on the different band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | | 3ms | asynchronous cells |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |
| T4 | | ms | 100 | |
| T5 | | ms | 100 | |

**Table A.5.1.57.1-2: Cell specific test parameters for E-UTRAN FDD – TDD Inter-band Inter-frequency async DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Special subframe configuration | | NA | | | | | 6 | | | | |
| Uplink-downlink configuration | | NA | | | | | 1 | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) A.3.2.1.2 (OP.2 FDD), A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | NA | NA | NA | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD |
| PCFICH/PDCCH/ PHICH parameters | | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | NA | NA | NA | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s/I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/ 15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.57.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 2ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 17ms ($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 2ms ($T_{interrupt2}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 2 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 17 ms.

## A.5.1.58 E-UTRAN TDD – FDD Inter-band Inter-frequency async DAPS handover

### A.5.1.58.1 Test Purpose and Environment

This test is to verify the requirement for the TDD – FDD Inter-band Inter-frequency async DAPS handover specified in clause 5.7.2.3. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA FDD cell on the different band as given in tables Table A.5.1.58.1-1 and Table A.5.1.58.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stop to send CSI report to the source cell.

**Table A.5.1.58.1-1: General test parameters for E-UTRAN TDD – FDD Inter-band Inter-frequency async DAPS handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| | Neighbouring cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF channel number | | | 1, 2 | TDD and FDD carriers on the different band are used |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | -4 | |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | DRX_L | As specified in clause A.3.3 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |

| | | | |
|---|---|---|---|
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | 3ms | asynchronous cells |
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |
| T4 | ms | 100 | |
| T5 | ms | 100 | |

**Table A.5.1.58.1-2: Cell specific test parameters for E-UTRAN TDD – FDD Inter-band Inter-frequency async DAPS handover test case**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Special subframe configuration | | 6 | | | | | NA | | | | |
| Uplink-downlink configuration | | 1 | | | | | NA | | | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) A.3.2.1.2 (OP.2 FDD), A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 FDD | OP.2 FDD | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | NA | NA | NA | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD |
| PCFICH/PDCCH/ PHICH parameters | | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | NA | NA | NA | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $\hat{E}_s/I_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | | | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/ 15 KHz | -94 | -94 | -94 | -94 | -94 | -infinity | -91 | -91 | -91 | -91 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.5.1.58.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms ($D_{handover1}$) from the beginning of time period T3. During $D_{handover1}$ the interruption on Cell 1 shall not exceed 2ms ($T_{interrupt1}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover1}$ can be expressed as: $D_{handover1} = T_{RRC_procedure} + T_{IU} + 20$ ms.

The UE shall complete to release Cell 1 less than 17ms ($D_{handover2}$) from the beginning of time period T4. During $D_{handover2}$, the interruption on Cell 2 shall not exceed 2ms ($T_{interrupt2}$).

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay $D_{handover2}$ can be expressed as: $T_{RRC_procedure} + T_{interrupt2}$, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

$T_{interrupt2}$ = 2 ms in the test; $T_{interrupt2}$ is defined in clause 5.7.2.1.2.

This gives a total of 17 ms.

# A.5.2 E-UTRAN Handover to other RATs

## A.5.2.1 E-UTRAN FDD – UTRAN FDD Handover

### A.5.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements specified in clause 5.3.1.

The test parameters are given in Tables A.5.2.1.1-1, A.5.2.1.1-2 and A.5.2.1.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.2.1.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN cell |
| | Neighbouring cell | | Cell 2 | UTRAN cell |
| Final condition | Active cell | | Cell 2 | UTRAN cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | | | RSRP | |
| Inter-RAT (UTRAN FDD) measurement quantity | | | CPICH Ec/N0 | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | Absolute UTRAN CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | | False | |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.2.1.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| RSRP Note 2 | dBm/15 KHz | -98 | -98 | -98 |
| Io Note 2 | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.1.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| CPICH_Ec/Ior | dB | -10 | | |
| PCCPCH_Ec/Ior | dB | -12 | | |
| SCH_Ec/Ior | dB | -12 | | |
| PICH_Ec/Ior | dB | -15 | | |
| DCH_Ec/Ior | dB | N/A | N/A | Note 1 |
| OCNS_Ec/Ior | dB | -0.941 | 0.941 | Note 2 |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | -1.8 | -1.8 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | -70 | -70 |
| CPICH_Ec/Io | dB | -infinity | -14 | -14 |
| Propagation Condition | | AWGN | | |

Note 1: The DPCH level is controlled by the power control loop

Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.

## A.5.2.1.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.1.1.1.

$T_{interrupt}$ = 140 ms in the test; $T_{interrupt}$ is defined in clause 5.3.1.1.2.

This gives a total of 190 ms.

## A.5.2.2 E-UTRAN TDD - UTRAN FDD Handover

### A.5.2.2.1 Test Purpose and Environment

This test is to verify the E-UTRAN TDD – UTRAN FDD handover requirements specified in clause 5.3.1.

The test scenario comprises of one E-UTRAN TDD cell and one UTRAN FDD cell as given in the tables A.5.2.2.1-1, A5.2.2.1-2 and A.5.2.2.1-3. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At start of time duration T1, the UE does not have any timing information of cell 2. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before the start of T2 to enable the monitoring of UTRAN FDD. A neighbouring cell list, including the UTRAN cell (cell2), shall be sent to the UE before T2 starts. During the time T2 cell 2 becomes detectable and the UE is expected to detect and send the measurement report. A RRC message implying handover shall be sent to the UE during T2, after the UE has reported event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.2.2.1-1: General test parameters for E-UTRAN TDD-UTRAN FDD handover**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| | Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Final conditions | Active cell | | Cell 2 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1 |
| E-UTRAN TDD measurement quantity | | | RSRP | |
| Inter-RAT (UTRA FDD) measurement quantity | | | CPICH Ec/Io | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | UTRAN FDD CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 | |
| DRX | | | OFF | No DRX configured. |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | |
| CP length | | | Normal | Applicable to cell 1 |
| Gap pattern configuration Id | | | 0 | As specified in Table 8.1.2.1-1; to start before T2 starts |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| UTRA RF Channel Number | | | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list before T2. |
| Post-verification period | | | False | Post verification is not used. |
| T1 | | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.2.2.1-2: Cell specific test parameters for E-UTRAN TDD (cell 1) for handover to UTRAN FDD (cell # 2)**

| Parameter | Unit | Cell 1 (E-UTRAN) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| RSRP | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s/I_{ot}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | 0 | 0 |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| Io Note 2 | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.2.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for handover from E-UTRAN TDD cell (cell #1)**

| Parameter | Unit | Cell 1 (UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| CPICH_Ec/Ior | dB | -10 | | |
| PCCPCH_Ec/Ior | dB | -12 | | |
| SCH_Ec/Ior | dB | -12 | | |
| PICH_Ec/Ior | dB | -15 | | |
| DPCH_Ec/Ior | dB | N/A | N/A | Note 1 |
| OCNS | dB | -0.941 | -0.941 | Note 2 |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | -1.8 | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | | |
| CPICH_Ec/Io | dB | -infinity | -14 | -14 |
| Propagation Condition | | AWGN | | |

Note 1: The DPCH level is controlled by the power control loop
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.

### A.5.2.2.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 190 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.1.1.1.1.

$T_{interrupt}$ = 140 ms in the test; $T_{interrupt}$ is defined in clause 5.3.1.1.2.

This gives a total of 190 ms.

## A.5.2.3 E-UTRAN FDD- GSM Handover

### A.5.2.3.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to GSM cell handover delay specified in clause 5.3.3.

The test parameters are given in Table A.5.2.3.1 -1, A.5.2.3.1 -2 and A.5.2.3.1 -3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 shall be used. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

The RRC message implying handover to cell 2 shall be sent to the UE during period T2, after the UE has reported Event B1. The start of T3 is defined as the end of last E-UTRAN TTI containing the RRC message implying handover.

The requirements are also applicable for a UE not requiring measurement gap, in which case no measurement gap pattern should be sent for the parameters specified in Table A.5.2.3.1-1.

**Table A.5.2.3.1 -1: General test parameters for E-UTRAN FDD-GSM handover**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Gap Pattern Id | | | 1 | As specified in TS 36.133 section8.1.2.1. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Inter-RAT measurement quantity | | | GSM Carrier RSSI | |
| Threshold other system | | dBm | -80 | Absolute GSM carrier RSSI threshold for event B1. |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | | OFF |
| T1 | | s | 20 | |
| T2 | | s | 7 | |
| T3 | | s | 1 | |

**Table A. A.5.2.3.1 - 2: Cell Specific Parameters for Handover from E- UTRAN FDD to GSM cell case (cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1, T2 | T3 |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | |
| PBCH_ RB | dB | | |
| PSS_ RA | dB | | |
| SSS_ RA | dB | | |
| PCFICH_ RB | dB | | |
| PHICH_ RA | dB | | |
| PHICH_ RB | dB | | |
| PDCCH_ RA | dB | | |
| PDCCH_ RB | dB | | |
| PDSCH_ RA | dB | | |
| PDSCH_ RB | dB | | |
| OCNG_ RA Note1 | dB | | |
| OCNG_ RB Note1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 (AWGN) | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| RSRP Note 3 | dBm/15kHz | -94 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.5.2.3.1 - 3: Cell Specific Parameters for Handover from E-UTRAN FDD to GSM cell case (cell 2)**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2, T3 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -85 | -75 |

### A.5.2.3.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 100 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{Handover\ delay}$ = 90 ms (Table 5.3.3.2.1-1) + $T_{offset}$ + $T_{UL}$

$T_{offset}$ : Equal to 4.65 ms, GSM timing uncertainty between the time from when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

$T_{UL}$: Equal to 4.65 ms, the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 99.3 ms, allow 100 ms in the test case.

# A.5.2.4 E-UTRAN TDD - UTRAN TDD Handover

## A.5.2.4.1 Test Purpose and Environment

### A.5.2.4.1.1 Void

### A.5.2.4.1.2 1.28 Mcps TDD option

This test is to verify the requirement for E-UTRAN TDD to UTRAN TDD handover requirements specified in clause 5.3.2.

The test scenario comprises of 1 E-UTRA TDD cell and 1 UTRA TDD cell as given in tables Table A.5.2.4.1.2-1, Table A.5.2.4.1.2-2, and Table A.5.2.4.1.2-3. Gap pattern configuration #0 as defined in table 8.1.2.1-1 is provided.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively.

E-UTRAN shall send a RRC message implying handover to UE. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The end of the last TTI containing handover message is begin of T3 duration.

**Table A.5.2.4.1.2-1: General test parameters for E-UTRA TDD to UTRA(1.28 Mcps TDD OPTION) handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | E-UTRA TDD cell |
| | Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Final conditions | Active cell | | Cell 2 | |
| Gap Pattern Id | | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | | Normal | |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | | | 1 | No additional delays in random access procedure due to ASC. |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| Ofn | | dB | 0 | |
| Thresh1 | | dBm | -93 | E-UTRA event B2 threshold |
| Thresh2 | | dBm | -80 | UTRA event B2 threshold |
| T1 | | s | 5 | |
| T2 | | s | ≤10 | |
| T3 | | s | 1 | |

**Table A.5.2.4.1.2-2: Cell specific test parameters for E-UTRA TDD to UTRA TDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |

| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD |
|---|---|---|---|---|
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 13 | -3 | -3 |
| $\hat{E}_s / N_{oc}$ | dB | 13 | -3 | -3 |
| $N_{oc}$ | dBm/15kHz | -98 | | |
| RSRP Note 2 | dBm/15kHz | -85 | -101 | -101 |
| SCH_RP Note 2 | dBm/15 kHz | -85 | -101 | -101 |
| Io Note 2 | dBm/9MHz | -57.01 | -68.45 | -68.45 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves

**Table A.5.2.4.1.2-3: Cell specific test parameters for cell search E-UTRA to UTRA case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | | | |
|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | DwPTS | | |
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number Note 21 | | Channel 2 | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | |
| DwPCH_Ec/Ior | dB | | | | 0 | | |
| OCNS_Ec/Ior | dB | -3 | | | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -3 | 11 | 11 | -3 | 11 | 11 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | | | |
| PCCPCH RSCP Note 2 | dBm | -86 | -72 | -72 | n.a. | | |
| Io Note 2 | dBm/1.28 MHz | -78.24 | -68.67 | -68.67 | | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.

Note 2: PCCPCH_RSCP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.5.2.4.1.3 Void

### A.5.2.4.2 Test Requirements

#### A.5.2.4.2.1 Void

#### A.5.2.4.2.2 1.28 Mcps TDD option

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 120 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.2.2.1.

$T_{interrupt}$ is defined in clause 5.3.2.2.2. $T_{interrupt}$ = 70 ms in the test as following:

$T_{interrupt1} = T_{offset} + T_{UL} + 30 * F_{SFN} + 20$ ms

$T_{offset}$ = 10 ms; $T_{UL}$ = 10 ms; and $F_{SFN}$ = 1 for UE decoding SFN.

This gives a total of 120 ms.

#### A.5.2.4.2.3 Void

## A.5.2.5 E-UTRAN FDD – UTRAN TDD Handover

### A.5.2.5.1 Test Purpose and Environment

#### A.5.2.5.1.1 Void

#### A.5.2.5.1.2 1.28 Mcps TDD option

This test is to verify the requirement for the E-UTRAN FDD to UTRAN TDD handover requirements specified in clause 5.3.2.

The test scenario comprises of two cells, E-UTRA TDD cell1 and UTRA TDD cell2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #1 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring. The test parameters are given in Tables A.5.2.5.1-1, A.5.2.5.1-2 and A.5.2.5.1-3.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.2.5.1.2-1: General test parameters for E-UTRA FDD to UTRA (1.28 Mcps TDD option) handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRA FDD cell |
| | Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Final conditions | Active cell | | Cell 2 | |

| | | | |
|---|---|---|---|
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| E-UTRAN FDD measurement quantity | | RSRP | |
| UTRAN TDD measurement quantity | | RSCP | |
| CP length of cell 1 | | Normal | |
| Access Barring Information | | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | | 1 | No additional delays in random access procedure due to ASC. |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Ofn | dB | 0 | |
| Thresh1 | dBm | -93 | Absolute E-UTRAN RSRP threshold for event B2 |
| Thresh2 | dBm | -80S | Absolute UTRAN RSCP threshold for event B2 |
| T1 | s | 5 | |
| T2 | s | ≤ 10 | |
| T3 | s | 1 | |

**Table A.5.2.5.1.2-2: Cell specific test parameters for E-UTRAN FDD to UTRAN (1.28 Mcps TDD option) handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / N_{oc}$ | dB | 13 | -3 | -3 |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s / I_{ot}$ | dB | 13 | -3 | -3 |
| RSRP Note 2 | dBm/15 KHz | -85 | -101 | -101 |
| Io Note 2 | dBm/9MHz | -57.01 | -68.45 | -68.45 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves

**Table A.5.2.5.1.2-3: Cell specific test parameters for E-UTRAN FDD to UTRAN (1.28 Mcps TDD option) handover test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | | | |
|---|---|---|---|---|---|---|---|
| Timeslot Number | | 0 | | | DwPTS | | |
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number Note 21 | | Channel 2 | | | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | | | |
| DwPCH_Ec/Ior | dB | | | | 0 | | |
| OCNS_Ec/Ior | dB | -3 | | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -3 | 11 | 11 | -3 | 11 | 11 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | | | |
| PCCPCH RSCP Note 2 | dBm | -86 | -72 | -72 | n.a. | | |
| Io Note 2 | dBm/1.28 MHz | -78.24 | -68.67 | -68.67 | | | |
| Propagation Condition | | AWGN | | | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>Note 2: PCCPCH_RSCP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

### A.5.2.5.1.3 Void

## A.5.2.5.2 Test Requirements

### A.5.2.5.2.1 Void

### A.5.2.5.2.2 1.28 Mcps TDD option

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 120 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.2.2.1.

$T_{interrupt}$ is defined in clause 5.3.2.2.2. $T_{interrupt}$ = 70 ms in the test as following:

$T_{interrupt1} = T_{offset} + T_{UL} + 30 * F_{SFN} + 20$ ms

$T_{offset}$ = 10 ms; $T_{UL}$ = 10 ms; and $F_{SFN}$ = 1 for UE decoding SFN.

This gives a total of 120 ms.

### A.5.2.5.2.3 Void

## A.5.2.6 E-UTRAN TDD - GSM Handover

### A.5.2.6.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to GSM cell handover delay specified in clause 5.3.3.

The test parameters are given in Table A.5.2.6.1-1, A.5.2.6.1-2 and A.5.2.6.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 shall be used. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

The RRC message implying handover to cell 2 shall be sent to the UE during period T2, after the UE has reported Event B1. The start of T3 is defined as the end of last E-UTRAN TTI containing the RRC message implying handover.

The requirements are also applicable for a UE not requiring measurement gap, in which case no measurement gap pattern should be sent for the parameters specified in Table A.5.2.6.1-1.

**Table A.5.2.6.1-1: General test parameters for E-UTRAN TDD toGSM neighbours handover test case in AWGN propagation condition**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | | Normal | |
| Inter-RAT measurement quantity | | | GSM Carrier RSSI | |
| E-UTRA RF Channel Number | | | 1 | E-UTRA RF Channel Number |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | E-UTRA Channel Bandwidth ($BW_{channel}$) |
| Threshold other system | | dBm | -80 | Absolute GSM carrier RSSI threshold for event B1. |
| Hysteresis | | dB | 0 | |
| Time to Trigger | | ms | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| T1 | | s | 20 | |
| T2 | | s | 7 | |
| T3 | | s | 1 | |

**Table A.5.2.6.1-2: Cell Specific Parameters for Handover E- UTRAN TDD to GSM handover test case**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1, T2 | T3 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | |
| PBCH_ RB | dB | | |
| PSS_ RA | dB | | |
| SSS_ RA | dB | | |
| PCFICH_ RB | dB | | |
| PHICH_ RA | dB | | |
| PHICH_ RB | dB | | |
| PDCCH_ RA | dB | | |
| PDCCH_ RB | dB | | |
| PDSCH_ RA | dB | | |
| PDSCH_ RB | dB | | |
| OCNG_ RA Note1 | dB | | |
| OCNG_ RB Note1 | dB | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 (AWGN) | |

| | | |
|---|---|---|
| $\hat{E}_s / I_{ot}$ | dB | 4 |
| RSRP Note 3 | dBm/15kHz | -94 |
| Propagation Condition | | AWGN |
| NOTE 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |
| NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | |
| NOTE 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

**Table A.5.2.6.1-3: Cell Specific Parameters for Handover E-UTRAN to GSM cell case (cell 2)**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2, T3 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -85 | -75 |

### A.5.2.6.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 100 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{Handover\ delay}$ = 90 ms (Table 5.3.3.2.1-1) + $T_{offset}$ + $T_{UL}$

$T_{offset}$: Equal to 4.65 ms, GSM timing uncertainty between the time from when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

$T_{UL}$: Equal to 4.65 ms, the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 99.3 ms, allow 100 ms in the test case.

## A.5.2.7 E-UTRAN FDD – UTRAN FDD Handover; Unknown Target Cell

### A.5.2.7.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements for the case when the target cell is unknown as specified in clause 5.3.1.

The test parameters are given in Tables A.5.2.7.1-1, A.5.2.7.1-2 and A.5.2.7.1-3. The test consists of two successive time periods, with time durations of T1, T2. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

**Table A.5.2.7.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN cell |
| | Neighbouring cell | | Cell 2 | UTRAN cell |
| Final condition | Active cell | | Cell 2 | UTRAN cell |

| | | | |
|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| E-UTRAN FDD measurement quantity | | RSRP | |
| Inter-RAT (UTRAN FDD) measurement quantity | | CPICH Ec/N0 | |
| DRX | | OFF | Non-DRX test |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | | False | |
| T1 | s | ≤5 | |
| T2 | s | 1 | |

**Table A.5.2.7.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRA) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.7.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | |
|---|---|---|---|
| | | T1 | T2 |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DCH_Ec/Ior | dB | Note 1 | |
| OCNS_Ec/Ior | dB | Note 2 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | -1.8 |
| $I_{oc}$ | dBm/3,84 MHz | -70 | -70 |
| CPICH_Ec/Io | dB | -infinity | -14 |
| Propagation Condition | AWGN | | |

Note 1: The DPCH level is controlled by the power control loop

Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.

### A.5.2.7.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 290 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay is 50ms. See clause 5.3.1.1.1.

$T_{interrupt}$ is 240ms. See clause 5.3.1.1.2.

This gives a total of 290ms in the test case.

## A.5.2.8 E-UTRAN FDD - GSM Handover; Unknown Target Cell

### A.5.2.8.1 Test Purpose and Environment

This test is to verify the E-UTRAN FDD to GSM handover requirements for the case when the target GSM cell is unknown as specified in clause 5.3.3.

The test parameters are given in Table A.5.2.8.1-1, A.5.2.8.1-2 and A.5.2.8.1-3 below. The test consists of two successive time periods, with time duration of T1, T2 respectively. At the start of time duration T1, the UE will not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

**Table A.5.2.8.1-1: General test parameters for E-UTRAN FDD to GSM handover test case; unknown target cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Gap Pattern Id | | | None | No measurement gaps shall be provided. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| DRX | | | OFF | No DRX configured |
| T1 | | s | 7 | |
| T2 | | s | 1 | |

**Table A.5.2.8.1 - 2: Cell specific parameters for cell # 1 in E-UTRAN FDD to GSM handover test case; unknown target cell**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | |
| PBCH_ RB | dB | | |
| PSS_ RA | dB | | |
| SSS_ RA | dB | | |
| PCFICH_ RB | dB | | |
| PHICH_ RA | dB | | |
| PHICH_ RB | dB | | |
| PDCCH_ RA | dB | | |
| PDCCH_ RB | dB | | |
| PDSCH_ RA | dB | | |
| PDSCH_ RB | dB | | |
| OCNG_ RA Note1 | dB | | |
| OCNG_ RB Note1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| RSRP Note 3 | dBm/15 kHz | -94 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.8.1-3: Cell specific parameters for cell # 2 in E-UTRAN FDD to GSM handover test case; unknown target cell**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -Infinity | -75 |

## A.5.2.8.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 200 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{Handover\ delay}$ = 190 ms (Table 5.3.3.2.1-1) + $T_{offset}$ + $T_{UL}$

$T_{offset}$: Equal to 4.65 ms is the GSM timing uncertainty from the time when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

$T_{UL}$: Equal to 4.65 ms is the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 199.3 ms, allow 200 ms in the test case.

## A.5.2.9 E-UTRAN TDD - GSM Handover; Unknown Target Cell

### A.5.2.9.1 Test Purpose and Environment

This test is to verify the E-UTRAN TDD to GSM handover requirements for the case when the target GSM cell is unknown as specified in clause 5.3.3.

The test parameters are given in Table A.5.2.9.1 -1, A.5.2.9.1 -2 and A.5.2.9.1 -3 below. The test consists of two successive time periods, with time duration of T1, T2 respectively. At the start of time duration T1, the UE will not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. No Gap pattern configuration shall be used.

**Table A.5.2.9.1-1: General test parameters for E-UTRAN TDD to GSM handover test case; unknown target cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | | None | No measurement gaps shall be provided. |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbour cell | | Cell 2 | |
| Final conditions | Active cell | | Cell 2 | |
| DRX | | | OFF | No DRX configured |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| T1 | | s | 7 | |
| T2 | | s | 1 | |

**Table A.5.2.9.1 - 2: Cell specific parameters for cell # 1 in E-UTRAN TDD to GSM handover test case; unknown target cell**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | |
| PBCH_ RB | dB | | |
| PSS_ RA | dB | | |
| SSS_ RA | dB | | |
| PCFICH_ RB | dB | | |
| PHICH_ RA | dB | | |
| PHICH_ RB | dB | | |
| PDCCH_ RA | dB | | |
| PDCCH_ RB | dB | | |
| PDSCH_ RA | dB | | |
| PDSCH_ RB | dB | | |
| OCNG_ RA Note1 | dB | | |
| OCNG_ RB Note1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| RSRP Note 3 | dBm/15 kHz | -94 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.9.1 - 3: Cell specific parameters for cell # 2 in E-UTRAN TDD to GSM handover test case; unknown target cell**

| Parameter | Unit | Cell 2 (GSM) | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -Infinity | -75 |

## A.5.2.9.2 Test Requirements

The UE shall begin to send access bursts on the new DCCH of the target cell less than 200 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{Handover\ delay}$ = 190 ms (Table 5.3.3.2.1-1) + $T_{offset}$ + $T_{UL}$

$T_{offset}$: Equal to 4.65 ms is the GSM timing uncertainty from the time when the UE is ready to transmit until the start of the next timeslot in GSM 26 multiframe structure

$T_{UL}$: Equal to 4.65 ms is the time the UE has to wait in case the next timeslot is an idle frame or a SACCH frame.

This gives a total of 199.3 ms, allow 200 ms in the test case.

# A.5.2.10 E-UTRAN TDD to UTRAN TDD handover: unknown target cell

## A.5.2.10.1 Test Purpose and Environment

This test is to verify the requirement for E-UTRAN TDD to UTRAN TDD handover requirements specified in clause 5.3.2 when the target UTRAN TDD cell is unknown.

The test scenario comprises of 1 E-UTRAN TDD cell and 1 UTRAN TDD cell as given in tables A.5.2.10.1-1, A.5.2.10.1-2, and A.5.2.10.1-3. No gap pattern is configured in the test case.

The test consists of two successive time periods, with time durations of T1 and T2 respectively. During time duration T1, a RRC message implying handover to UTRA 1.28Mcps TDD cell shall be sent to the UE. The end of the last TTI containing handover message is the beginning of T2 duration.

**Table A.5.2.10.1-1: General test parameters for E-UTRAN TDD to unknown UTRAN TDD cell handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN TDD cell |
| | Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD cell |
| Final conditions | Active cell | | Cell 2 | UTRA 1.28Mcps TDD cell |
| CP length of cell 1 | | | Normal | |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| Time offset between cells | | | 3 ms | Asynchronous cells |
| Access Barring Information | | | Not Sent | No additional delays in random access procedure. |
| Assigned Sub-Channel Number | | | 1 | No additional delays in random access procedure due to ASC. |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | |
| T1 | | s | 5 | During T1, cell 2 shall be powered off, and during the off time the physical layer cell identity shall be changed. |
| T2 | | s | 1 | |

**Table A.5.2.10.1-2: Cell specific test parameters for E-UTRAN TDD to unknown UTRAN TDD cell handover test case (cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| BWchannel | MHz | 10 | |

| OCNG Patterns defined in TS36.133 A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
|---|---|---|---|
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RANote 1 | dB | | |
| OCNG_RBNote 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 |
| $N_{oc}$ | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -95 | -95 |
| SCH_RP | dBm/15 kHz | -95 | -95 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.5.2.10.1-3: Cell specific test parameters for E-UTRAN TDD to unknown UTRAN TDD cell test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number[Note1] | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | |
| DwPCH_Ec/Ior | dB | | | 0 | |
| OCNS_Ec/Ior | dB | -3 | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 13 | -infinity | 13 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -infinity | -70 | n.a. | |
| Propagation Condition | | AWGN | | | |
| Note1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>Note2: P-CCPCH RSCP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

## A.5.2.10.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 280 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.2.2.1.

$T_{interrupt}$ is defined in clause 5.3.2.2.2. $T_{interrupt}$ = 230 ms in the test as following:

$T_{interrupt1} = T_{offset} + T_{UL} + 30 * F_{SFN} + 180$ ms

$T_{offset}$ = 10 ms; $T_{UL}$ = 10 ms; and $F_{SFN}$ = 1 for UE decoding SFN.

This gives a total of 280 ms.

# A.5.2.10A E-UTRAN FDD – UTRAN FDD Multicarrier Handover with two target cells

## A.5.2.10A.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to UTRAN FDD handover requirements specified in clause 5.3.1 in a 2 cell multicarrier configuration. It is applicable to UEs that support DC-HSDPA, DB-DC-HSDPA and which do not support 3C-HSDPA or 4C-HSDPA.

The test parameters are given in Tables A.5.2.10A.1-1, A.5.2.10A.1-2 and A.5.2.10A.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 and cell 3 become detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover to cell 2 and cell 3 shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target Primary Serving HS-DSCH cell and cell 3 as the target Secondary Serving HS-DSCH cell.

**Table A.5.2.10A.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN cell |
| | Neighbouring cell | | Cell 2 | UTRAN cell |
| Final condition | Active cell | | Cell 2 and cell 3 | UTRAN cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | | | RSRP | |
| Inter-RAT (UTRAN FDD) measurement quantity | | | CPICH Ec/Io | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-UTRA | | dB | -18 | Absolute UTRAN CPICH Ec/Io threshold for event B2 |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| UTRA RF Channel Number | | | 1 | One UTRA FDD carrier frequency is used. |

| | | | |
|---|---|---|---|
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell before T2. |
| Post-verification period | | False | |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.2.10A.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| RSRP Note 2 | dBm/15 KHz | -98 | -98 | -98 |
| Io Note 2 | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.10A.1-3: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD multi carrier handover test case (cell 2 and cell 3)**

| | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| UTRA RF Channel Number | | Channel 1 | | | Channel 2 | | |
| Cell type | | Primary Serving HS-DSCH Cell | | | Secondary Serving HS-DSCH Cell | | |
| CPICH_Ec/Ior | dB | -10 | | | -10 | | |
| PCCPCH_Ec/Ior | dB | -12 | | | -12 | | |
| SCH_Ec/Ior | dB | -12 | | | -12 | | |
| PICH_Ec/Ior | dB | -15 | | | -15 | | |
| HS-SCCH_Ec/Ior | dB | -13 | | | -13 | | |
| HS_DPDCH_Ec/Ior | dB | -10 | | | -10 | | |
| DPCH_Ec/Ior | dB | Note 1 | | | N/A | | |
| OCNS | | Note 2 | | | -2.02 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Inf | -1.8 | -1.8 | -Inf | -1.8 | -1.8 |

| | | | |
|---|---|---|---|
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| Propagation Condition | | AWGN | AWGN |
| Note 1: The DPCH level is controlled by the power control loop<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$<br>Note 3: The UE shall be scheduled continuously with HS-DSCH data during T3 using both cell 2 and cell 3 | | | |

### A.5.2.10A.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 210 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.1.1.1.

$T_{interrupt}$ = 160 ms in the test; $T_{interrupt}$ is defined in clause 5.3.1.1.2.

This gives a total of 210 ms.

## A.5.2.10B E-UTRAN TDD – UTRAN FDD Multicarrier Handover with two target cells

### A.5.2.10B.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to UTRAN FDD handover requirements specified in clause 5.3.1 in a 2 cell multicarrier configuration. It is applicable to UEs that support DC-HSDPA, DB-DC-HSDPA and which do not support 3C-HSDPA or 4C-HSDPA.

The test parameters are given in Tables A.5.2.10B.1-1, A.5.2.10B.1-2 and A.5.2.10B.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 and cell 3 become detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover to cell 2 and cell 3 shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target Primary Serving HS-DSCH cell and cell 3 as the target Secondary Serving HS-DSCH cell.

**Table A.5.2.10B.1-1: General test parameters for E-UTRAN TDD to UTRAN FDD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| | Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Final conditions | Active cell | | Cell 2 and cell 3 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1 |
| E-UTRAN TDD measurement quantity | | | RSRP | |
| Inter-RAT (UTRA FDD) measurement quantity | | | CPICH Ec/Io | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |

| | | | |
|---|---|---|---|
| b2-Threshold2-UTRA | dB | -18 | UTRAN FDD CPICH Ec/Io threshold for event B2 |
| Hysteresis | dB | 0 | |
| DRX | | OFF | No DRX configured. |
| Time to Trigger | ms | 0 | |
| Filter coefficient | | 0 | |
| CP length | | Normal | Applicable to cell 1 |
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1; to start before T2 starts |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list before T2. |
| Post-verification period | | False | Post verification is not used. |
| T1 | s | 5 | |
| T2 | s | ≤5 | |
| T3 | s | 1 | |

**Table A.5.2.10B.1-2: Cell specific test parameters for E-UTRAN TDD to UTRAN FDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRAN) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note 1] | | | | |
| OCNG_RB[Note 1] | | | | |
| RSRP | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| Io [Note 2] | dBm/9 MHz | -67.21 | -67.21 | -67.21 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.2.10B.1-3: Cell specific test parameters for E-UTRAN TDD to UTRAN FDD multi carrier handover test case (cell 2 and cell 3)**

| | | Cell 2 | Cell 3 |
|---|---|---|---|

| | | T1 | T2 | T3 | T1 | T2 | T3 |
|---|---|---|---|---|---|---|---|
| UTRA RF Channel Number | | Channel 1 | | | Channel 2 | | |
| Cell type | | Primary Serving HS-DSCH Cell | | | Secondary Serving HS-DSCH Cell | | |
| CPICH_Ec/Ior | dB | -10 | | | -10 | | |
| PCCPCH_Ec/Ior | dB | -12 | | | -12 | | |
| SCH_Ec/Ior | dB | -12 | | | -12 | | |
| PICH_Ec/Ior | dB | -15 | | | -15 | | |
| HS-SCCH_Ec/Ior | dB | -13 | | | -13 | | |
| HS_DPDCH_Ec/Ior | dB | -10 | | | -10 | | |
| DPCH_Ec/Ior | dB | Note 1 | | | N/A | | |
| OCNS | | Note 2 | | | -2.02 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Inf | -1.8 | -1.8 | -Inf | -1.8 | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | | | | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Note 1: The DPCH level is controlled by the power control loop<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$<br>Note 3: The UE shall be scheduled continuously with HS-DSCH data during T3 using both cell 2 and cell 3 | | | | | | | |

### A.5.2.10B.2 Test Requirements

The UE shall start to transmit the UL DPCCH to Cell 2 less than 210 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.3.1.1.1.

$T_{interrupt}$ = 160 ms in the test; $T_{interrupt}$ is defined in clause 5.3.1.1.2.

This gives a total of 210 ms.

## A.5.2.11 E-UTRAN FDD – UTRAN FDD Handover for 5MHz Bandwidth

### A.5.2.11.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.5.2.1.1.

The parameters of this test are the same as defined in Subclause A.5.2.1.1 except that the values of the parameters in the Table A.5.2.11.1-1 will replace the values of the corresponding parameters in A.5.2.1.1-1, and the values of the parameters in the Table A.5.2.11.1-2 will replace the values of the corresponding parameters in A.5.2.1.1-2.

**Table A.5.2.11.1-1: General test parameters for E-UTRAN FDD to UTRAN FDD handover test case for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 5 | |
| Note 1: See Table A.5.2.1.1-1 for other general test parameters.<br>Note 2: This test is according to the principle defined in section A.3.7.2. | | | |

**Table A.5.2.11.1-2: Cell specific test parameters for E-UTRAN FDD to UTRAN FDD handover test case (cell 1)**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |

| $BW_{channel}$ | MHz | 5 | | |
|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | OP.15 FDD | OP.16 FDD |
| Io Note 2 | dBm/4.5 MHz | -70.22 | -70.22 | -70.22 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 3: See Table A.5.2.1.1-2 for other cell specific test parameters. | | | | |

### A.5.2.11.2 Test Requirements

The test requirements defined in section A.5.2.1.2 shall apply to this test case.

## A.5.3 E-UTRAN Handover to Non-3GPP RATs

### A.5.3.1 E-UTRAN FDD – HRPD Handover

#### A.5.3.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to HRPD handover requirements specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.1.1-1, A.5.3.1.1-2 and A.5.3.1.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.1.1-1: General test parameters for E-UTRAN FDD to HRPD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbouring cell | | Cell 2 | HRPD cell |
| Final condition | Active cell | | Cell 2 | HRPD cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN FDD measurement quantity | | | RSRP | |
| Inter-RAT (HRPD) measurement quantity | | | CDMA2000 HRPD Pilot Strength | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -7 | Absolute 'CDMA2000 HRPD Pilot Strength' threshold for event B2 |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |

| | | | |
|---|---|---|---|
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 | |
| HRPD RF Channel Number | | 1 | One HRPD carrier frequency is used. |
| HRPD neighbour cell list size | | 8 | HRPD cells on HRPD RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 1 | |

**Table A.5.3.1.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to HRPD cell # 2**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.1.1-3: Cell specific test parameters for HRPD (cell # 2) for handover from E-UTRAN FDD cell (cell #1)**

| Parameter | Unit | Cell 2 (HRPD) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | 0 | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 | -3 |
| Propagation Condition | | AWGN | | |

## A.5.3.1.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.4.1.1.1.

$T_{interrupt}$ = 76.66 ms in the test; $T_{interrupt}$ is defined in clause 5.4.1.1.2.

This gives a total of 126.66 ms, allow 127 ms in the test.

## A.5.3.2 E-UTRAN FDD – cdma2000 1X Handover

## A.5.3.2.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to cdma2000 1X handover requirements specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.2.1-1, A.5.3.2.1-2 and A.5.3.2.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.2.1-1: General test parameters for E-UTRAN FDD to cdma2000 1X handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbouring cell | | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell | | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |

| | | | |
|---|---|---|---|
| E-UTRAN FDD measurement quantity | | RSRP | |
| Inter-RAT (cdma2000 1X) measurement quantity | | CDMA2000 1xRTT Pilot Strength | |
| b2-Threshold1 | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | dB | -14 | Absolute 'CDMA2000 1xRTT Pilot Strength' threshold for event B2 |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | Non-DRX test |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 | |
| cdma2000 1X RF Channel Number | | 1 | One HRPD carrier frequency is used. |
| cdma2000 1X neighbour cell list size | | 8 | cdma2000 1X cells on cdma2000 1X RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 1 | |

**Table A.5.3.2.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to cdma2000 1X cell # 2**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.2.1-3: Cell specific test parameters for cdma2000 1X (cell # 2) for handover from E-UTRAN FDD cell (cell #1)**

| Parameter | Unit | Cell 2 (cdma2000 1X) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | 0 | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 | -10 |
| Propagation Condition | | AWGN | | |

### A.5.3.2.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T3.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 130 ms, which is specified in clause 5.4.2.1.1.

$T_{interrupt}$ = 170 ms in the test; $T_{interrupt}$ is defined in clause 5.4.2.1.2.

This gives a total of 300 ms.

## A.5.3.3 E-UTRAN FDD – HRPD Handover; Unknown Target Cell

### A.5.3.3.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to HRPD handover requirements for the case when the target HRPD cell is unknown as specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.3.1-1, A.5.3.3.1-2 and A.5.3.3.1-3. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. During time period T1, message containing Information Element *systemTimeInfo* as defined in clause 6.3.1 of TS 36.331 [2] shall be sent by the System Simulator (SS). No gap patterns are configured in the test case. No HRPD neighbour cell list shall be provided to the UE.

A RRC message implying handover to the unknown HRPD cell shall be sent to the UE towards the end of the time period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.3.1-1: General test parameters for E-UTRAN FDD to HRPD handover test case; unknown target HRPD cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbouring cell | | Cell 2 | HRPD cell |
| Final condition | Active cell | | Cell 2 | HRPD cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| DRX | | | OFF | Non-DRX test |

| | | | |
|---|---|---|---|
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 10 | |
| HRPD RF Channel Number | | 1 | One HRPD carrier frequency is used. |
| cdma2000-SearchWindowSize | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | s | ≤5 | |
| T2 | s | 1 | |

**Table A.5.3.3.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to unknown HRPD cell # 2**

| Parameter | Unit | Cell 1 (E-UTRAN FDD) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.3.1-3: Cell specific test parameters for unknown HRPD (cell # 2) for handover from E-UTRAN FDD cell (cell #1)**

| Parameter | Unit | Cell 2 (HRPD) | |
|---|---|---|---|
| | | T1 | T2 |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 |
| Propagation Condition | | AWGN | |

## A.5.3.3.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay is expressed as: RRC procedure delay + $T_{interrupt}$, where:

$T_{interrupt}$ also includes time to detect HRPD cell; see clause 5.4.1.1.2

This gives a total of 126.66 ms, allow 127 ms in the test case.

## A.5.3.4 E-UTRAN FDD – cdma2000 1X Handover; Unknown Target cell

### A.5.3.4.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN FDD to cdma2000 1X handover requirements for the case when the target cdma2000 1X cell is unknown as specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.4.1-1, A.5.3.4.1-2 and A.5.3.4.1-3. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. During time period T1, message containing Information Element *systemTimeInfo* as defined in clause 6.3.1 of TS 36.331 [2] shall be sent by the System Simulator (SS). No gap patterns are configured in the test case. No cdma2000 1X neighbour cell list shall be provided to the UE.

A RRC message implying handover to the unknown cdma2000 1X cell shall be sent to the UE towards the end of the time period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.2.1-1: General test parameters for E-UTRAN FDD to cdma2000 1X handover test case; unknown target cdma2000 1X cell**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN FDD cell |
| | Neighbouring cell | | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell | | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| cdma2000 1X RF Channel Number | | | 1 | One HRPD carrier frequency is used. |
| cdma2000-SearchWindowSize | | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | ≤5 | |
| T2 | | s | 1 | |

**Table A.5.3.2.1-2: Cell specific test parameters for E-UTRAN FDD cell#1 for handover to unknown cdma2000 1X cell # 2**

| Parameter | Unit | Cell 1 (E-UTRAN FDD) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |

| | | | |
|---|---|---|---|
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.2.1-3: Cell specific test parameters for unknown cdma2000 1X (cell # 2) for handover from E-UTRAN FDD cell (cell #1)**

| Parameter | Unit | Cell 2 (cdma2000 1X) | |
|---|---|---|---|
| | | T1 | T1 |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 |
| Propagation Condition | | AWGN | |

## A.5.3.4.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay is expressed as: RRC procedure delay + $T_{interrupt}$, where:

$T_{interrupt}$ also includes time to detect cdma2000 1X cell; see clause 5.4.2.1.2

This gives a total of 300 ms.

# A.5.3.5 E-UTRAN TDD – HRPD Handover

## A.5.3.5.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to HRPD handover requirements specified in clause 5.4.1.

The test parameters are given in Tables A.5.3.5.1-1, A.5.3.5.1-2 and A.5.3.5.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.5.1-1: General test parameters for E-UTRAN TDD to HRPD handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN TDD cell |
| | Neighbouring cell | | Cell 2 | HRPD cell |
| Final condition | Active cell | | Cell 2 | HRPD cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN TDD measurement quantity | | | RSRP | |
| Inter-RAT (HRPD) measurement quantity | | | CDMA2000 HRPD Pilot Strength | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -7 | Absolute 'CDMA2000 HRPD Pilot Strength' threshold for event B2 |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| Uplink-downlink configuration of cell 1 | | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | | 6 | As specified in table 4.2.1 in TS 36.211 |
| HRPD RF Channel Number | | | 1 | One HRPD carrier frequency is used. |
| HRPD neighbour cell list size | | | 8 | HRPD cells on HRPD RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | | s | 5 | |
| T2 | | s | ≤10 | |
| T3 | | s | 1 | |

**Table A.5.3.5.1-2: Cell specific test parameters for E-UTRAN TDD cell#1 for handover to HRPD cell # 2**

| Parameter | Unit | Cell 1 (E-UTRA) |
|---|---|---|

| | | T1 | T2 | T3 |
|---|---|---|---|---|
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in TS36.133 A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.5.1-3: Cell specific test parameters for HRPD (cell # 2) for handover from E-UTRAN TDD cell (cell #1)**

| Parameter | Unit | Cell 2 (HRPD) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 0 | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 | -3 |
| Propagation Condition | | AWGN | | |

## A.5.3.5.2 Test Requirements

The UE shall start transmission of the reverse control channel in HRPD to Cell 2 less than 127 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms, which is specified in clause 5.4.1.1.1.

$T_{interrupt}$ = 76.66 ms in the test; $T_{interrupt}$ is defined in clause 5.4.1.1.2.

This gives a total of 126.66 ms, allow 127 ms in the test.

## A.5.3.6 E-UTRAN TDD – cdma2000 1X Handover

### A.5.3.6.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN TDD to cdma2000 1X handover requirements specified in clause 5.4.2.

The test parameters are given in Tables A.5.3.6.1-1, A.5.3.6.1-2 and A.5.3.6.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain cell 2 as the target cell.

**Table A.5.3.6.1-1: General test parameters for E-UTRAN TDD to cdma2000 1X handover test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | E-UTRAN TDD cell |
| | Neighbouring cell | | Cell 2 | cdma2000 1X cell |
| Final condition | Active cell | | Cell 2 | cdma2000 1X cell |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Gap Pattern Id | | | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| E-UTRAN TDD measurement quantity | | | RSRP | |
| Inter-RAT (cdma2000 1X) measurement quantity | | | CDMA2000 1xRTT Pilot Strength | |
| b2-Threshold1 | | dBm | -90 | Absolute E-UTRAN RSRP threshold for event B2 |
| b2-Threshold2-CDMA2000 | | dB | -14 | Absolute 'CDMA2000 1xRTT Pilot Strength' threshold for event B2 |
| Hysteresis | | dB | 0 | |
| TimeToTrigger | | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| cdma2000 1X RF Channel Number | | | 1 | One cdma2000 1X carrier frequency is used. |
| cdma2000 1X neighbour cell list size | | | 8 | cdma2000 1X cells on cdma2000 1X RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |

| | | | |
|---|---|---|---|
| T1 | S | 5 | |
| T2 | S | ≤10 | |
| T3 | S | 1 | |

**Table A.5.3.6.1-2: Cell specific test parameters for E-UTRAN TDD cell#1 for handover to cdma2000 1X cell # 2**

| Parameter | Unit | Cell 1 (E-UTRA) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | 0 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.5.3.6.1-3: Cell specific test parameters for cdma2000 1X (cell # 2) for handover from E-UTRAN TDD cell (cell #1)**

| Parameter | Unit | Cell 2 (cdma2000 1X) | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 0 | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 | -10 |
| Propagation Condition | | AWGN | | |

#### A.5.3.6.2 Test Requirements

The UE shall start transmission of the reverse control channel in cdma2000 1X to Cell 2 less than 300 ms from the beginning of time period T3.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 130 ms, which is specified in clause 5.4.2.1.1.

$T_{interrupt}$ = 170 ms in the test; $T_{interrupt}$ is defined in clause 5.4.2.1.2.

This gives a total of 300 ms.

# A.6 RRC Connection Control

## A.6.1 RRC Re-establishment

### A.6.1.1 E-UTRAN FDD Intra-frequency RRC Re-establishment

#### A.6.1.1.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.1.1-1 and table A.6.1.1.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.1.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 3 | |

**Table A.6.1.1.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50\ ms + N_{freq} * T_{search} + T_{SI} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 100\ ms$

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

## A.6.1.2 E-UTRAN FDD Inter-frequency RRC Re-establishment

### A.6.1.2.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.1.2-1 and table A.6.1.1.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

**Table A.6.1.2.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |
| E-UTRA FDD inter-frequency carrier list size | | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 5000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 5 | |

**Table A.6.1.2.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | -Infinity | -Infinity | - Infinity | - Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | - Infinity | -Infinity | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown E-UTRA FDD inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI}$ + $T_{PRACH}$

$N_{freq}$ = 2

$T_{search}$ = 800 ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

# A.6.1.3 E-UTRAN TDD Intra-frequency RRC Re-establishment

## A.6.1.3.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.3.1-1 and table A.6.1.3.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.3.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 3 | |

**Table A.6.1.3.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | 0 | | | 0 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI}$ + $T_{PRACH}$

$N_{freq}$ = 1

$T_{search}$ = 100 ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

## A.6.1.4 E-UTRAN TDD Inter-frequency RRC Re-establishment

### A.6.1.4.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.4.1-1 and table A.6.1.4.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

**Table A.6.1.4.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |
| E-UTRA TDD inter-frequency carrier list size | | | 1 | 2 E-UTRA TDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 5000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 5 | |

**Table A.6.1.4.1-2: Cell specific test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | -Infinity | -Infinity | - Infinity | - Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | - Infinity | -Infinity | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.4.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown E-UTRA TDD inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI}$ + $T_{PRACH}$

$N_{freq}$ = 2

$T_{search}$ = 800 ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

## A.6.1.5 E-UTRAN FDD Intra-frequency RRC Re-establishment for 5MHz bandwidth

### A.6.1.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.1.1.1.

The parameters of this test are the same as defined in Subclause A.6.1.1.1 except that the values of the parameters in the Table A.6.1.5.1-1 will replace the values of the corresponding parameters in A.6.1.1.1-1, and the values of the parameters in the Table A.6.1.5.1-2 will replace the values of the corresponding parameters in A.6.1.1.1-2.

**Table A.6.1.5.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Note 1: See Table A.6.1.1.1-1 for the other parameters.<br>Note 2: This test is according to the principle defined in section A.3.7.2. | | | |

**Table A.6.1.5.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case for 5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | OP.15 FDD | OP.16 FDD | OP.16 FDD | OP.16 FDD | OP.15 FDD |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: See Table A.6.1.5.1-2 for the other parameters. | | | | | | | |

### A.6.1.5.2 Test Requirements

The test requirements defined in section A.6.1.1.2 shall apply to this test case.

## A.6.1.6 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for UE category 0

### A.6.1.6.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.6.1-1 and table A.6.1.6.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.6.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.13 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |

| | | | |
|---|---|---|---|
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | ms | 200 | |
| T3 | s | 3 | |

**Table A.6.1.6.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.6.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}$.

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI}$ + $T_{PRACH}$

$N_{freq}$ = 1

$T_{search}$ = 100 ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

## A.6.1.7 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for UE category 0

### A.6.1.7.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.7.1-1 and table A.6.1.7.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.7.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.1 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.3 HD-FDD | As specified in clause A.3.1.2.3 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 3 | |

**Table A.6.1.7.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.7.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 100$ ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

## A.6.1.8 E-UTRAN TDD Intra-frequency RRC Re-establishment for UE category 0

### A.6.1.8.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.1.2.

The test parameters are given in table A.6.1.8.1-1 and table A.6.1.8.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.8.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.12 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 200 | |
| T3 | | s | 3 | |

**Table A.6.1.8.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |

| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.8.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 100$ ms

$T_{SI}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1445 ms, allow 1.5 s in the test case.

# A.6.1.9 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

## A.6.1.9.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.9.1-1 and table A.6.1.9.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.9.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 400 | |
| T3 | | s | 3 | |

**Table A.6.1.9.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.1 | | R.21 FDD | R.21 FDD | - | - | - | R.21 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 | | R.17 FDD | | | R.17 FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.9.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ + $T_{PRACH}$

$N_{freq}$ = 1

$T_{search}$ = 0 ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

## A.6.1.10 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

### A.6.1.10.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.10.1-1 and table A.6.1.10.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.10.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | ms | 400 | |
| T3 | | s | 3 | |

**Table A.6.1.10.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.2 | | R.11 HD-FDD | R.11 HD-FDD | - | - | - | R.11 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.2 | | R.7 HD-FDD | | | R.7 HD-FDD | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.10.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50\ ms + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 0$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

## A.6.1.11 E-UTRAN TDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

### A.6.1.11.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.11.1-1 and table A.6.1.11.1-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.11.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |

| | | | |
|---|---|---|---|
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | µs | 3 | Synchronous cells |
| T1 | s | 5 | |
| T2 | ms | 400 | |
| T3 | s | 3 | |

**Table A.6.1.11.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.3 | | R.17 TDD | R.17 TDD | - | - | - | R.17 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.3 | | R.15 TDD | | | R.15 TDD | | |
| OCNG Patterns in cluse A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -Infinity | -Infinity | -3.79 | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -Infinity | -Infinity | 4 | 4 | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -Infinity | -Infinity | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.11.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 1.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50\ ms + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 0$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1345 ms, allow 1.5 s in the test case.

## A.6.1.12 E-UTRAN FD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

### A.6.1.12.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.12.1-1 and table A.6.1.12.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.12.1-1: General test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |

| | | | |
|---|---|---|---|
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |
| T3 | ms | 4000 | |
| T4 | s | 9 | |

**Table A.6.1.12.1-2: Cell specific test parameters for E-UTRAN FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | R.23 FDD | R.23 FDD | R.23 FDD | - | - | - | - | R.23 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | | -3 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.12.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}$.

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 0$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} = 6400$ ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 6485 ms, allow 7 s in the test case.

# A.6.1.13 E-UTRAN HD-FDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

## A.6.1.13.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.13.1-1 and table A.6.1.13.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.13.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | | ms | 3 | Asynchronous cells |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| T3 | | ms | 4000 | |
| T4 | | s | 9 | |

**Table A.6.1.13.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.5 | | R.13 HD-FDD | R.13 HD-FDD | R.13 HD-FDD | - | - | - | - | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.5 | | R.9 HD-FDD | | | | R.9 HD-FDD | | | |
| OCNG Patterns in clause A.3.2. | | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | | -3 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.13.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50\ ms + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$

$N_{freq} = 1$

$T_{search}$ = 0 ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$ = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6465 ms, allow 7 s in the test case.

## A.6.1.14 E-UTRAN TDD Intra-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

### A.6.1.14.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.14.1-1 and table A.6.1.14.1-2 below. The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.14.1-1: General test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_3CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| Time offset between cells | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| T3 | | ms | 4000 | |
| T4 | | s | 9 | |

**Table A.6.1.14.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 1 | | | |

| $BW_{channel}$ | MHz | 10 | | | | 10 | | | |
|---|---|---|---|---|---|---|---|---|---|
| PDSCH Reference Channel in clause A.3.1.4.6 | | R.19 TDD | R.19 TDD | R.19 TDD | - | - | - | - | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.6 | | R.17 TDD | | | | R.17 TDD | | | |
| OCNG Patterns in clause A.3.2.2 | | OP.11 TDD | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2TDD | OP.11 TDD |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.14.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD intra frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$

$N_{freq} = 1$

$T_{search} = 0$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$ = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6465 ms, allow 7s in the test case.

# A.6.1.15 HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

## A.6.1.15.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT FDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.15.1-1 and table A.6.1.15.1-2 below. nCell1 and nCell2 are NB-IoT cells with different physical cell ID on the same frequency carrier. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.15.1-1: General test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| Final condition | Active cell | | nCell2 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | Refer to A.3.18 |
| NPDCCH repetition level | | | 16 | NPDCCH $R_{max}$ |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311-v13xy | | Ms | 60000 | RRC re-establishment timer |
| DRX | | | OFF | |
| T1 | | S | 5 | |
| T2 | | Ms | 400 | |
| T3 | | S | 60 | |

**Table A.6.1.15.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | | | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | | |
| NPDSCH parameters | | eCell1 $BW_{channel}$ 5MHz: R.16 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.14 HD-FDD | | | eCell1 $BW_{channel}$ 5MHz: R.16 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.14 HD-FDD | | |
| NPDCCH parameters | | eCell1 $BW_{channel}$ 5MHz: R.38 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.26 HD-FDD | | | eCell1 $BW_{channel}$ 5MHz: R.38 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.26 HD-FDD | | |
| NPBCH_RA | dB | 0 | | | 0 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.1.15.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -110.6 | -110.6 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |
| Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.6.1.15.1-3: eCell 1 and eCell2 specific test parameters for HD-FDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | |
| NOCNG Patterns | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dBm | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.<br>Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

## A.6.1.15.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT FDD intra frequency cell shall be less than 58 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT}.$$

Where:

- $T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.
- $T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB\text{-}IoT} + T_{SI_NB\text{-}IoT} + T_{PRACH_NB\text{-}IoT}$
- $N_{NB\text{-}Iot\text{-}freq} = 1$
- $T_{search_NB\text{-}IoT} = 14800$ ms
- $T_{SI_NB\text{-}IoT} = 41560$ ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.
- $T_{PRACH_NB\text{-}IoT} = 1280$ ms; it is the additional delay caused by the random access procedure.

## A.6.1.16 HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

### A.6.1.16.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.16.1-1 and table A.6.1.16.1-2 below. nCell1 and nCell2 are NB-IoT cells on different frequency carriers. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be indicated with the carrier frequency of nCell 2 to ensure that the UE has the context of the carrier frequency of nCell 2.

**Table A.6.1.16.1-1: General test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, nCell2 | |
| Final condition | Active cell | | nCell2 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| NPRACH Configuration | | | NPRACH.R-1 | Refer to A.3.18 |
| NPDCCH repetition level | | | 16 | NPDCCH $R_{max}$ |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | Ms | 15000 | RRC re-establishment timer |
| DRX | | | OFF | |
| T1 | | S | 5 | |
| T2 | | Ms | 400 | |
| T3 | | S | 15 | |

**Table A.6.1.16.1-2: nCell 1, nCell 2 specific test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | | | eCell1 $BW_{channel}$ 5MHz: 22<br>eCell1 $BW_{channel}$ 10MHz: 35 | | |
| NPDSCH parameters | | eCell1 $BW_{channel}$ 5MHz: R.16 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.14 HD-FDD | | | eCell1 $BW_{channel}$ 5MHz: R.16 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.14 HD-FDD | | |
| NPDCCH parameters | | eCell1 $BW_{channel}$ 5MHz: R.38 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.26 HD-FDD | | | eCell1 $BW_{channel}$ 5MHz: R.38 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.26 HD-FDD | | |
| NPBCH_RA | dB | 0 | | | 0 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.1.16.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -94 | -94 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | ms | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.1.16.1-3: eCell 1 specific test parameters for HD-FDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | Unit | eCell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | |
| NOCNG Patterns | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 4 | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| RSRP Note2 | dBm/15 kHz | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.6.1.16.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT FDD inter frequency cell shall be less than 12 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT}.$$

Where:

- $T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.
- $T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB\text{-}IoT} + T_{SI_NB\text{-}IoT} + T_{PRACH_NB\text{-}IoT}$
- $N_{NB\text{-}Iot\text{-}freq} = 2$
- $T_{search_NB\text{-}IoT} = 1400\ ms$
- $T_{SI_NB\text{-}IoT} = 8320\ ms$; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT FDD cell.
- $T_{PRACH_NB\text{-}IoT} = 80\ ms$; it is the additional delay caused by the random access procedure.

## A.6.1.17 E-UTRAN FD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

### A.6.1.17.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.17.1-1 and table A.6.1.17.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

**Table A.6.1.17.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |

| | | | | |
|---|---|---|---|---|
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |
| E-UTRA FDD inter-frequency carrier list size | | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| PRACH Configuration | | | PRACH_2CE | As specified in A.3.16 |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | | ms | 3000 | RRC re-establishment timer |
| DRX | | | OFF | |
| CP length | | | Normal | |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | | s | 5 | |
| T2 | | ms | 400 | |
| T3 | | s | 3 | |

**Table A.6.1.17.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH parameters (As specified in clause A.3.1.4.1) | | DL Reference Measurement Channel R.21 FDD | | | DL Reference Measurement Channel R.21 FDD | | |
| MPDCCH parameters (As specified in clause A.3.1.3.1) | | DL Reference Measurement Channel R.17 FDD | | | DL Reference Measurement Channel R.17 FDD | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | -Infinity | -91 |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.17.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ + $T_{PRACH}$

$N_{freq}$ = 2

$T_{search}$ = 1000 ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

## A.6.1.18 E-UTRAN HD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

### A.6.1.18.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA HD-FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.18.1-1 and table A.6.1.18.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

**Table A.6.1.18.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |

| | | | |
|---|---|---|---|
| E-UTRA FDD inter-frequency carrier list size | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRACH Configuration | | PRACH_2CE | As specified in A.3.16 |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | ms | 400 | |
| T3 | s | 3 | |

**Table A.6.1.18.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH parameters (As specified in clause A.3.1.4.2) | | DL Reference Measurement Channel R.11 HD-FDD | | | DL Reference Measurement Channel R.11 HD-FDD | | |
| MPDCCH parameters (As specified in clause A.3.1.3.2) | | DL Reference Measurement Channel R.11 HD-FDD | | | DL Reference Measurement Channel R.11 HD-FDD | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | -Infinity | -91 |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 (Asynchronous cells) | Ms | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.18.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ + $T_{PRACH}$

$N_{freq}$ = 2

$T_{search}$ = 1000 ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

## A.6.1.19 E-UTRAN TDD-TDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeA

### A.6.1.19.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test parameters are given in table A.6.1.19.1-1 and table A.6.1.19.2-2 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of radio link failure. At the start of time period T3, cell 2, which is the neighbour cell, is activated.

**Table A.6.1.19.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |

| | | | |
|---|---|---|---|
| E-UTRA TDD inter-frequency carrier list size | | 1 | 2 E-UTRA TDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRACH Configuration | | PRACH_2CE | As specified in A.3.16 |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-1 in TS 36.211 |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | s | 5 | |
| T2 | ms | 400 | |
| T3 | s | 3 | |

**Table A.6.1.19.1-2: Cell specific test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH parameters (As specified in clause A.3.1.4.3) | | DL Reference Measurement Channel R.17 TDD | | | DL Reference Measurement Channel R.17 TDD | | |
| MPDCCH parameters (As specified in clause A.3.1.3.3) | | DL Reference Measurement Channel R.15 TDD | | | DL Reference Measurement Channel R.15 TDD | | |
| OCNG Patterns defined in A.3.2.2.11 (OP.11 TDD) and in A.3.2.2.2 (OP.2_TDD) | | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.11 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| MPDCCH_RA | dB | | | | | | |
| MPDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | -Infinity | -Infinity | -Infinity | -Infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -Infinity | -Infinity | -Infinity | -Infinity | -91 |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 (Synchronous cells) | µs | - | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.19.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 3.5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA} + T_{PRACH}$

$N_{freq} = 2$

$T_{search} = 1000$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeA}$ = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 3345 ms, allow 3.5 s in the test case.

## A.6.1.20 E-UTRAN FD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

### A.6.1.20.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.20.1-1: General test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |

| | | | |
|---|---|---|---|
| E-UTRA FDD inter-frequency carrier list size | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| PRACH Configuration | | PRACH_3CE | As specified in A.3.16 |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | s | 5 | |
| T2 | s | 5 | |
| T3 | s | 4 | |
| T4 | s | 9 | |

**Table A.6.1.20.1-2: Cell specific test parameters for E-UTRAN FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | |
| $BW_{channel}$ | MHz | 5<br>10 | | | | 5<br>10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | 5MHz: R.31 FDD<br>10MHz: R.23 FDD | | | - | - | | | 5MHz: R.31 FDD<br>10MHz: R.23 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD | 5 MHz: OP.19 FDD<br>10MHz: OP.6 FDD | | | 5 MHz: OP.22 FDD<br>10MHz: OP.21 FDD |
| PBCH_RA | dB | -3 | | | | -3 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| $\hat{E}_s / I_{ot}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | | 3 | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.20.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50 \text{ ms} + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$

$N_{freq} = 2$

$T_{search} = 100$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} = 6400$ ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

## A.6.1.21 E-UTRAN HD-FDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

### A.6.1.21.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA HD-FDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.21.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |

| | | | |
|---|---|---|---|
| E-UTRA FDD inter-frequency carrier list size | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRACH Configuration | | PRACH_3CE | As specified in A.3.16 |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| T1 | s | 5 | |
| T2 | s | 5 | |
| T3 | s | 400 | |
| T4 | s | 9 | |

**Table A.6.1.21.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | R.13 HD-FDD | | | - | - | | | R.13 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.19 FDD | | | | R.19 FDD | | | |
| OCNG Patterns in clause A.3.2.1 | | OP.21 FDD | | | OP.6 FDD | OP.6 FDD | | | OP.21 FDD |
| PBCH_RA | dB | -3 | | | | -3 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Asynchronous cells) | ms | - | | | | 3 | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.21.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA FDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay}$ = 50 ms + $N_{freq}$* $T_{search}$ + $T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$ + $T_{PRACH}$

$N_{freq}$ = 2

$T_{search}$ = 100 ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB}$ = 6400 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN FDD cell.

$T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

## A.6.1.22 E-UTRAN TDD Inter-frequency RRC Re-establishment for Cat-M1 UE in CEModeB

### A.6.1.22.1 Test Purpose and Environment

The purpose is to verify that the E-UTRA TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements in clause 6.7.2.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. During T1, both cell 1 and cell 2 are in CEModeB, and UE shall be indicated with the carrier frequency of Cell 2 to ensure that the UE has the context of the carrier frequency of Cell 2. At the start of time period T3, cell 1, which is the active cell, is deactivated. The time period T4 starts after the occurrence of the radio link failure.

**Table A.6.1.22.1-1: General test parameters for E-UTRAN TDD inter-frequency RRC Re-establishment test case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number (cell 1) | | | 1 | Only one FDD carrier frequency is used. |
| E-UTRA RF Channel Number (cell 2) | | | 2 | |

| | | | |
|---|---|---|---|
| E-UTRA FDD inter-frequency carrier list size | | 1 | 2 E-UTRA FDD carrier frequencies in total: 1 intra-frequency and 1 inter-frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRACH Configuration | | PRACH_3CE | As specified in A.3.16 |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 3000 | RRC re-establishment timer |
| DRX | | OFF | |
| CP length | | Normal | |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration index | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| T1 | s | 5 | |
| T2 | s | 5 | |
| T3 | s | 400 | |
| T4 | s | 9 | |

**Table A.6.1.22.1-2: Cell specific test parameters for E-UTRAN HD-FDD inter-frequency RRC Re-establishment test case**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | | 10 | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | R.19 TDD | | | - | - | | | R.19 TDD |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.17 FDD | | | | R.17 FDD | | | |
| OCNG Patterns in clause A.3.2.1 | | OP.11 TDD | | | OP.2 TDD | OP.2 FDD | | | OP.11 FDD |
| PBCH_RA | dB | -3 | | | | -3 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| MPDCCH_RA | dB | | | | | | | | |
| MPDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 1.54 | -15.27 | -Infinity | -Infinity | -3.79 | -12.14 | -12 | -12 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -15 | -Infinity | -Infinity | 4 | -12 | -12 | -12 |
| RSRP Note 3 | dBm/15 KHz | -91 | -113 | -Infinity | -Infinity | -94 | -110 | -110 | -110 |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 2x1 | | | | 2x1 | | | |
| Timing offset to Cell 1 (Synchronous cells) | μs | - | | | | 3 | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.6.1.22.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T4, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known E-UTRA TDD inter frequency cell shall be less than 7 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE_re\text{-}establish_delay}.$$

Where:

$T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.

$T_{UE_re\text{-}establish_delay} = 50\ ms + N_{freq} * T_{search} + T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} + T_{PRACH}$

$N_{freq} = 2$

$T_{search} = 100$ ms

$T_{SI\text{-}EUTRA\text{-}M1\text{-}CEModeB} = 6400$ ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRAN TDD cell.

$T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 6665 ms, allow 7 s in the test case.

## A.6.1.23 E-UTRAN TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage

### A.6.1.23.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT TDD inter-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.23.1-1 and table A.6.1.23.1-2 below. nCell1 and nCell2 are NB-IoT cells on different frequency carriers. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be indicated with the carrier frequency of nCell 2 to ensure that the UE has the context of the carrier frequency of nCell 2.

**Table A.6.1.23.1-1: General test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, nCell2 | |
| Final condition | Active cell | | nCell2 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell. |

| | | | |
|---|---|---|---|
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | NPRACH.R-2 | As specified in A.3.18 |
| NPDCCH repetition level | | 16 | The value shall be used for all cells in the test. |
| N310 | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | ms | 0 | Radio link failure timer; T310 is disabled |
| T311 | ms | 15000 | RRC re-establishment timer |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | ms | 400 | |
| T3 | s | 15 | |

**Table A.6.1.23.1-2: nCell 1, nCell 2 specific test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 10MHz: 30 | | | eCell1 $BW_{channel}$ 10MHz: 35 | | |
| NPDSCH parameters | | eCell1 $BW_{channel}$ 10MHz: R.14 NB-TDD | | | eCell1 $BW_{channel}$ 10MHz: R.14 NB-TDD | | |
| NPDCCH parameters | | eCell1 $BW_{channel}$ 10MHz: R.26 NB-TDD | | | eCell1 $BW_{channel}$ 10MHz: R.26 NB-TDD | | |
| NPBCH_RA | dB | 0 | | | 0 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.1.23.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | 4 | 4 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -94 | -94 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | μs | - | | | 3 | | |

Note 1: NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.1.23.1-3: eCell 1 specific test parameters for TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage**

| Parameter | Unit | eCell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | |
| NOCNG Patterns | | $BW_{channel}$ 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |

| | | | | |
|---|---|---|---|---|
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 4 | 4 | 4 |
| RSRP Note2 | dBm/15 kHz | -94 | -94 | -94 |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x1 | | |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.<br>Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |

### A.6.1.23.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT TDD inter frequency cell shall be less than 12 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT}.$$

Where:

- $T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.
- $T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB\text{-}IoT} + T_{SI_NB\text{-}IoT} + T_{RACH_NB\text{-}IoT}$
- $N_{NB\text{-}Iot\text{-}freq} = 2$
- $T_{search_NB\text{-}IoT} = 1400\ ms$
- $T_{SI_NB\text{-}IoT} = 8320\ ms$; it is the time required for receiving all the relevant system information as defined in TS 36.331 [2] for the target NB-IoT TDD cell.
- $T_{PRACH_NB\text{-}IoT} = 80\ ms$; it is the additional delay caused by the random access procedure.

## A.6.1.24 E-UTRAN TDD - TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage

### A.6.1.24.1 Test Purpose and Environment

The purpose is to verify that the NB-IoT TDD intra-frequency RRC re-establishment delay is within the specified limits. These tests will verify the requirements for Cat-NB1 UE in clause 6.5.

The test parameters are given in table A.6.1.24.1-1 and table A.6.1.24.1-2 below. nCell1 and nCell2 are NB-IoT cells with different physical cell ID on the same frequency carrier. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

**Table A.6.1.24.1-1: General test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IOT operational mode | | | In-band | |
| Initial condition | Active cell | | nCell1 | |
| | Neighbour cells | | eCell1, eCell2, nCell2 | |
| Final condition | Active cell | | nCell2 | |
| E-UTRA RF Channel Number | | | 1 | One carrier frequency is used for eCell1 and eCell2. |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| NPRACH Configuration | | | NPRACH.R-2 | As specified in A.3.18 |
| NPDCCH repetition level | | | 16 | NPDCCH $R_{max}$ |
| N310 | | - | 1 | Maximum consecutive out-of-sync indications from lower layers |
| N311 | | - | 1 | Minimum consecutive in-sync indications from lower layers |
| T310 | | Ms | 0 | Radio link failure timer; T310 is disabled |
| T311-v13xy | | Ms | 60000 | RRC re-establishment timer |
| DRX | | | OFF | |
| T1 | | S | 5 | |
| T2 | | Ms | 400 | |
| T3 | | S | 60 | |

**Table A.6.1.24.1-2: nCell 1, nCell 2 specific test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | Unit | nCell 1 | | | nCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | kHz | 200 | | | 200 | | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 10MHz: 30 | | | eCell1 $BW_{channel}$ 10MHz: 30 | | |
| NPDSCH parameters | | eCell1 $BW_{channel}$ 10MHz: R.14 NB-TDD | | | eCell1 $BW_{channel}$ 10MHz: R.14 NB-TDD | | |
| NPDCCH parameters | | eCell1 $BW_{channel}$ 10MHz: R.26 NB-TDD | | | eCell1 $BW_{channel}$ 10MHz: R.26 NB-TDD | | |
| NPBCH_RA | dB | 0 | | | 0 | | |
| NPBCH_RB | dB | | | | | | |
| NPSS_RA | dB | | | | | | |
| NSSS_RA | dB | | | | | | |
| NPDCCH_RA | dB | | | | | | |
| NPDCCH_RB | dB | | | | | | |
| NPDSCH_RA | dB | | | | | | |
| NPDSCH_RB | dB | | | | | | |
| NOCNG_RA Note 1 | dB | | | | | | |
| NOCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.1.24.1-3 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| $\hat{E}_s / I_{ot}$ Note2 | dB | 7 | -Infinity | -Infinity | -Infinity | -12.6 | -12.6 |
| NRSRP Note2 | dBm/15 kHz | -91 | -Infinity | -Infinity | -Infinity | -110.6 | -110.6 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to nCell 1 | us | - | | | 3 | | |

| | |
|---|---|
| Note 1: | NOCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Es/Iot and NRSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.6.1.24.1-3: eCell 1 and eCell2 specific test parameters for TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Patterns | | $BW_{channel}$ 10MHz: NOP.1 TDD | | | $BW_{channel}$ 10MHz: NOP.1 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| Qrxlevmin | dBm | -140 | -140 | -140 | -140 | -140 | -140 |
| Pcompensation | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| Note2 | dBm/15 kHz | -98 | | | -98 | | |
| | dBm | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 | -12.6 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | us | - | | | 3 | | |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

Note 3: Es/Iot and RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.24.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send NPRACH preambles to cell 2 for sending the *RRCConnectionReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NB-IoT TDD intra frequency cell shall be less than 60 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-}establish_delay} = T_{UL_grant} + T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT}.$$

Where:

- $T_{UL_grant}$ = It is the time required to acquire and process uplink grant from the target cell. The NPRACH reception at the system simulator is used as a trigger for the completion of the test; hence $T_{UL_grant}$ is not used.
- $T_{UE\text{-}re\text{-}establish_delay_NB\text{-}IoT} = 100\ ms + N_{NB\text{-}Iot\text{-}freq} * T_{search_NB\text{-}IoT} + T_{SI_NB\text{-}IoT} + T_{PRACH_NB\text{-}IoT}$
- $N_{NB\text{-}Iot\text{-}freq} = 1$
- $T_{search_NB\text{-}IoT} = 14800\ ms$

- $T_{SI_NB\text{-}IoT}$ = 41560 ms; it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target NB-IoT TDD cell.

- $T_{PRACH_NB\text{-}IoT}$ = 2560 ms; it is the additional delay caused by the random access procedure.

# A.6.2 Random Access

## A.6.2.1 E-UTRAN FDD – Contention Based Random Access Test

### A.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.1.1-1 and A.6.2.1.1-2.

**Table A.6.2.1.1-1: General test parameters for FDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.1/2 FDD Note 1 | As defined in A.3.2.1.1/2. |
| PDSCH parameters Note 4 | | DL Reference Measurement Channel R.0 FDD Note 4 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ($P_{CMAX}$) | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 4 | As defined in table 5.7.1-2 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. | | | |

| | |
|---|---|
| Note 2: | Io level has been derived from other parameters for information purpose. It is not a settable parameter. |
| Note 3: | RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. |
| Note 4: | The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. |

**Table A.6.2.1.1-2: RACH-Configuration parameters for FDD contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| mac-ContentionResolutionTimer | sf48 | 48 sub-frames |
| maxHARQ-Msg3Tx | 4 | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.1.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.1.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.1.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.1.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.1.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.1.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.1.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

## A.6.2.2 E-UTRAN FDD – Non-Contention Based Random Access Test

### A.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.2.1-1 and A.6.2.2.1-2.

**Table A.6.2.2.1-1: General test parameters for FDD non-contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern | | OP.1 FDD | As defined in A.3.2.1.1. |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |

| | | | |
|---|---|---|---|
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ($P_{CMAX}$) | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 4 | As defined in table 5.7.1-2 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | |

**Table A.6.2.2.1-2: RACH-Configuration parameters for FDD non-contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.2.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.2.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

## A.6.2.3 E-UTRAN TDD – Contention Based Random Access Test

### A.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.3.1-1 and A.6.2.3.1-2.

**Table A.6.2.3.1-1: General test parameters for TDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | - | OP.1/2 TDD Note 1 | As defined in A.3.2.2.1/2. |
| PDSCH parameters Note 4 | - | DL Reference Measurement Channel R.0 TDD Note 4 | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |

| | | | |
|---|---|---|---|
| Configured UE transmitted power ($P_{CMAX}$) | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.<br>Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | |

**Table A.6.2.3.1-2: RACH-Configuration parameters for TDD contention based random access test**

| Field | Value | Comment |
|---|---|---|
| numberOfRA-Preambles | n52 | |
| sizeOfRA-PreamblesGroupA | n52 | No group B. |
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| mac-ContentionResolutionTimer | sf48 | 48 sub-frames |
| maxHARQ-Msg3Tx | 4 | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.3.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.1.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.3.2.2 No Random Access Response reception

To test the UE behavior specified in Subclause 6.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.3.2.3 Receiving a NACK on msg3

To test the UE behavior specified in Subclause 6.2.2.1.3 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.3.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.3.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.3.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

## A.6.2.4 E-UTRAN TDD – Non-Contention Based Random Access Test

### A.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.4.1-1 and A.6.2.4.1-2.

**Table A.6.2.4.1-1: General test parameters for TDD non-contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern | - | OP.1 TDD | As defined in A.3.2.2.1. |
| PDSCH parameters | - | DL Reference Measurement Channel R.0 TDD | As defined in A.3.1.1.2. |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ($P_{CMAX}$) | dBm | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter. | | | |

**Table A.6.2.4.1-2: RACH-Configuration parameters for TDD non-contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.4.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble

after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.4.2.2 No Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.5 E-UTRAN FDD – Contention Based Random Access Test for 5MHz bandwidth

#### A.6.2.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.2.1.1.

The parameters of this test are the same as defined in Subclause A.6.2.1.1 except that the values of the parameters in the Table A.6.2.5.1-1 will replace the values of the corresponding parameters in A.6.2.1.1-1

**Table A.6.2.5.1-1: General test parameters for FDD contention based random access test for 5MHz bandwidth**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| $BW_{channel}$ | MHz | 5 | |
| OCNG Pattern Note 1 | | OP.15/16 FDD Note 1 | As defined in A.3.2.1.15/16. |
| PDSCH parameters Note 2 | | DL Reference Measurement Channel R.5 FDD Note 2 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As defined in A.3.1.2.1. |
| Io Note 2 | dBm/4.5 MHz | -68.5 | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.<br>Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.<br>Note 3: See Table A.6.2.1.1-1 for the other parameters.<br>Note 4: This test is according to the principle defined in section A.3.7.2. | | | |

### A.6.2.5.2 Test Requirements

The test requirements defined in section A.6.2.1.2 shall apply to this test case.

## A.6.2.6 E-UTRAN FDD – Non-contention Based Random Access Test for 5MHz bandwidth

### A.6.2.6.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.6.2.2.1.

The parameters of this test are the same as defined in Subclause A.6.2.2.1except that the values of the parameters in the Table A.6.2.6.1-1will replace the values of the corresponding parameters in A.6.2.2.1-1

**Table A.6.2.6.1-1: General test parameters for FDD non-contention based random access test for 5MHz bandwidth**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| $BW_{channel}$ | MHz | 5 | |
| OCNG Pattern Note 1 | | OP.15 FDD Note 1 | As defined in A.3.2.1.15. |
| PDSCH parameters Note 2 | | DL Reference Measurement Channel R.5 FDD Note 2 | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As defined in A.3.1.2.1. |
| Io Note 2 | dBm/4.5 MHz | -68.5 | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter<br>Note 3: See Table A.6.2.2.1-1 for the other parameters.<br>Note 4: This test is according to the principle defined in section A.3.7.2. | | | |

### A.6.2.6.2 Test Requirements

The test requirements defined in section A.6.2.2.2 shall apply to this test case.

## A.6.2.7 E-UTRAN FDD – Non-Contention Based Random Access Test For SCell

### A.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure, for the SCell, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell and SCell are different timing advance group. Cell 1 is in the primary Timing Advance Group (pTAG) and Cell 2 is in the secondary Timing Advance Group (sTAG). The purpose of the PCell is to allow the SCell to be configured and to handle the Random Access Response which takes place on PCell. The test parameters are given in tables A.6.2.7.1-1 and A.6.2.7.1-2.

**Table A.6.2.7.1-1: General test parameters for FDD non-contention based random access test**

| Parameter | Unit | Cell 1 | Cell 2 | Comments |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | MHz | 10 | 10 | |
| Active PCell | | Cell 1 | | Primary cell of RF channel number 1. |
| Active SCell | | | Cell 2 | Secondary cell of RF channel number 2. |

| TAG configuration | | pTAG | sTAG | pTAG+sTAG configures Cell 1 and Cell 2 to separate TAGs |
|---|---|---|---|---|
| OCNG Pattern | | OP.1 FDD | OP.1 FDD | As defined in A.3.2.1.11. |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | DL Reference Measurement Channel R.0 FDD | As defined in A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1. |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ( $P_{CMAX,c}$ ) | dBm | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

**Table A.6.2.7.1-2: RACH-Configuration parameters for FDD non-contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.7.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.2.7.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.7.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.2.2 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator on Cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.7.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on Cell 1, the PCell. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.8 E-UTRAN TDD – Non-Contention Based Random Access Test For SCell

#### A.6.2.8.1 Test Purpose and Environment

This test is applicable for UE supporting the optional capability of Multiple Timing Advance.

The purpose of this test is to verify that the behavior of the random access procedure, for the SCell, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell and SCell are different timing advance group. Cell 1 is in the primary Timing Advance Group (pTAG) and Cell 2 is in the secondary Timing Advance Group (sTAG). The purpose of the PCell is to allow the SCell to be configured and to handle the Random Access Response which takes place on PCell. The test parameters are given in tables A.6.2.8.1-1 and A.6.2.8.1-2.

**Table A.6.2.8.1-1: General test parameters for TDD non-contention based random access test**

| Parameter | Unit | Cell 1 | Cell 2 | Comments |
|---|---|---|---|---|
| E-UTRA RF Channel Number | - | 1 | 1 | |
| $BW_{channel}$ | MHz | 10 | 10 | |
| Active PCell | | Cell 1 | | Primary cell of RF channel number 1. |
| Active SCell | | | Cell 2 | Secondary cell of RF channel number 2. |
| TAG configuration | | pTAG | sTAG | pTAG+sTAG configures Cell 1 and Cell 2 to separate TAGs |
| OCNG Pattern | - | OP.1 TDD | OP.1 TDD | As defined in A.3.2.2.1. |
| PDSCH parameters | - | DL Reference Measurement Channel R.0 TDD | DL Reference Measurement Channel R.0 TDD | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters | - | DL Reference Measurement Channel R.6 TDD | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2. |
| Special subframe configuration | - | 6 | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | |
| Io Note 2 | dBm/9 MHz | -65.5 | -65.5 | |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ( $P_{CMAX,c}$ ) | dBm | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

**Table A.6.2.8.1-2: RACH-Configuration parameters for TDD non-contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.8.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.8.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.8.2.2 No Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on Cell 1, the PCell, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on Cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.8.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on Cell 1, the PCell. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

## A.6.2.9 3DL/3UL TDD CA Non-Contention Based Random Access Test for 2 SCells

### A.6.2.9.1 Test Purpose and Environment

This test is applicable for UE supporting the optional capability of Multiple Timing Advance.

The purpose of this test is to verify that the behavior of the random access procedure, for the two SCells, is according to the requirements and that the PRACH power settings and timing, for the SCell, are within specified limits. This test will verify the requirements in Clause 6.2.2 and Clause 7.1.2 in an AWGN model.

For this test three cells are used. Cell 1 is PCell, Cell 2 is SCell1 and Cell 3 is SCell2. Cell 1 and Cell 2/Cell 3 belong to different timing advance groups. Cell 1 is in the primary Timing Advance Group (pTAG). Cell 2 and Cell3 are in the same secondary Timing Advance Group (sTAG). The purpose of the Cell 1 is to allow Cell 2 and Cell 3 to be configured and to handle the Random Access Response which takes place on Cell 1. The test parameters are given in tables A.6.2.9.1-1 and A.6.2.9.1-2.

**Table A.6.2.9.1-1: General test parameters for 3DL/3UL TDD CA non-contention based random access test**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Comments |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | - | 1 | 2 | 3 | |
| $BW_{channel}$ | - | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| TAG configuration | - | pTAG | sTAG | sTAG | Cell 2 and Cell 3 are in the same sTAG |
| PDSCH parameters: DL Reference Measurement Channel | - | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | As defined in A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | - | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | As defined in A.3.1.2.2. |
| OCNG Patterns | - | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | As defined in A.3.2.2. |
| Special subframe configuration | - | 6 | 6 | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | 1 | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | 0 | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | -98 | -98 | |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 3 | 3 | 3 | |
| Io Note 2 | dBm/ $BW_{channel}$ | -65.5+10log ($N_{RB,c}$ /50) | -65.5+10log ($N_{RB,c}$ /50) | -65.5+10log ($N_{RB,c}$ /50) | |
| RSRP Note 3 | dBm/15 KHz | -95 | -95 | -95 | |
| referenceSignalPower | dBm/15 KHz | -5 | -5 | -5 | As defined in clause 6.3.2 in TS 36.331. |
| Configured UE transmitted power ( $P_{CMAX,c}$ ) | dBm | 23 | 23 | 23 | As defined in clause 6.2.5 in TS 36.101. |
| PRACH Configuration Index | - | 53 | 53 | 53 | As defined in table 5.7.1-3 in TS 36.211. |
| Backoff Parameter Index | - | 2 | 2 | 2 | As defined in table 7.2-1 in TS 36.321. |
| Propagation Condition | - | AWGN | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 | |
| Timing offset to Cell 1 | μs | - | 0 | 0 | |
| Time alignment error relative to cell 1 Note 4 | μs | - | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 2 Note 4 | μs | - | - | ≤ TAE | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.<br>Note 4: The time alignment error (TAE) between two cells specified in TS36.104 [30] clause 6.5.3.1 (value depends upon the type of carrier aggregation).<br>Note 5: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |

**Table A.6.2.9.1-2: RACH-Configuration parameters for cell2 and cell3 for 3DL/3UL TDD CA non-contention based random access test**

| Field | Value | Comment |
|---|---|---|
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| ra-ResponseWindowSize | sf10 | 10 sub-frames |
| Note 1: For further information see Clause 6.3.2 in TS 36.331. | | |

## A.6.2.9.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.9.2.1 Random Access Response Reception

#### A.6.2.9.2.1.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on cell 1 a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 2. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.9.2.1.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2.2.1 the System Simulator shall transmit, on cell 1 a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 3. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

### A.6.2.9.2.2 No Random Access Response Reception

#### A.6.2.9.2.2.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on cell 1, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 2. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 2.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.9.2.2.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2.2.2 the System Simulator shall transmit, on cell 1, a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator, on cell 3. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 3.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

#### A.6.2.9.2.3 Stop Preamble transmission if maximum number of preamble transmission counter has been reached

##### A.6.2.9.2.3.1 Test Requirements for Cell 2

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on cell 1. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 2.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 2 shall be within the accuracy specified in Subclause 7.1.2.

##### A.6.2.9.2.3.2 Test Requirements for Cell 3

To test the UE behavior specified in Subclause 6.2.2 the System Simulator shall transmit, in response to the first 6 preambles, a Random Access Response *not* corresponding to the transmitted Random Access Preamble on cell 1. The UE shall stop transmitting preambles after 6 preambles.

The UE shall re-transmit the preamble with the calculated PRACH transmission power on cell 3.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions on cell 3 shall be within the accuracy specified in Subclause 7.1.2.

## A.6.2.10 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

### A.6.2.10.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Normal Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.10.1-1 and A.6.2.10.1-2.

**Table A.6.2.10.1-1: General test parameters for FDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.21 FDD | As defined in A. A.3.2.1.21. |
| PDSCH parameters Note 2 | | R.20 FDD | As defined in A.3.1.4.1 |
| MPDCCH parameters Note 2 | | R.16 FDD | As defined in A.3.1.3.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1 |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |

| | | | |
|---|---|---|---|
| SSS_RA | dB | 0 | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -103 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 3 | |
| RSRP Note 3 | dBm/15 KHz | -100 | |
| Io Note 3 | dBm/9 MHz | -70.45 | |
| Propagation Condition | - | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.10.1-2: RACH-Configuration parameters for FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | | |
| preambleTransMax | n6 | | | | |
| maxHARQ-Msg3Tx | 4 | | | | |
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.10.1-3: PRACH-Configuration parameters for FDD contention based random access test**

| Field | Value | Comment |
|---|---|---|
| **Parameters not per CE Levels** | | |
| rsrp-ThresholdsPrach | {24, 27, 33} | Corresponding to {-116, -113, -107} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | |
| referenceSignalPower | -5 dBm/15 KHz | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | As defined in table 7.2-1 in TS 36.321 |

| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
|---|---|---|---|---|---|
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

## A.6.2.10.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.10.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

### A.6.2.10.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.10.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.10.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.10.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.10.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.10.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level **0**.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.11 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

### A.6.2.11.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Normal Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.11.1-1 and A.6.2.11.1-2.

**Table A.6.2.11.1-1: General test parameters for HD-FDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.21 FDD | As defined in A.3.2.1.21. |

| | | | |
|---|---|---|---|
| PDSCH parameters Note 2 | | R.10 HD-FDD | As defined in A.3.1.4.2 |
| MPDCCH parameters Note 2 | | R.6 HD-FDD | As defined in A.3.1.3.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.3 HD-FDD | As defined in A.3.1.2.3 |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -103 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 3 | |
| RSRP Note 3 | dBm/15 KHz | -100 | |
| Io Note 3 | dBm/9 MHz | -70.45 | |
| Propagation Condition | - | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.11.1-2: RACH-Configuration parameters for HD-FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | | |
| preambleTransMax | n6 | | | | |
| maxHARQ-Msg3Tx | 4 | | | | |
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.11.1-3: PRACH-Configuration parameters for HD-FDD contention based random access test**

| Field | Value | Comment |
|---|---|---|

| Parameters not per CE Levels | | | | | |
|---|---|---|---|---|---|
| rsrp-ThresholdsPrach | {24, 27, 33} | | | | Corresponding to {-116, -113, -107} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | | |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

## A.6.2.11.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.11.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

### A.6.2.11.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.11.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.11.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.11.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.11.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.11.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level **0**.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.12 E-UTRAN TDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage

### A.6.2.12.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Normal Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.12.1-1 and A.6.2.12.1-2.

**Table A.6.2.12.1-1: General test parameters for TDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.11 TDD | As defined in A.3.2.2.11. |
| PDSCH parameters Note 2 | | R.16 TDD | As defined in A.3.1.4.3 |
| MPDCCH parameters Note 2 | | R.14 TDD | As defined in A.3.1.3.3 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2 |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -103 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 3 | |
| RSRP Note 3 | dBm/15 KHz | -100 | |
| Io Note 3 | dBm/9 MHz | -70.45 | |
| Propagation Condition | - | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.12.1-2: RACH-Configuration parameters for TDD contention based random access test**

| Field | Value | Comment |
|---|---|---|
| **Parameters not per CE Levels** | | |
| numberOfRA-Preambles | n52 | |
| sizeOfRA-PreamblesGroupA | n52 | No group B. |
| powerRampingStep | dB2 | |
| preambleInitialReceivedTargetPower | dBm-120 | |
| preambleTransMax | n6 | |
| maxHARQ-Msg3Tx | 4 | |

| | | | | | |
|---|---|---|---|---|---|
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note 1: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.12.1-3: PRACH-Configuration parameters for TDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {24, 31, 38} | | | | Corresponding to {-116, -109, -102} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | | |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
| **Parameters per PRACH CE Levels** | | | | | |
| **CE Level** | **Level 0** | **Level 1** | **Level 2** | **Level 3** | |
| prach-ConfigIndex | 53 | 53 | 53 | 53 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

## A.6.2.12.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.12.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.12.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.12.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.12.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.12.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.12.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.12.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 0.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.13 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

### A.6.2.13.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Enhanced Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 7.24.2, Clause 6.2.3 and Clause 7.1.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.13.1-1 and A.6.2.13.1-2.

**Table A.6.2.13.1-1: General test parameters for FDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.21 FDD | As defined in A.3.2.1.21. |
| PDSCH parameters Note 2 | | R.22 FDD | As defined in A.3.1.4.4 |
| MPDCCH parameters Note 2 | | R.18 FDD | As defined in A.3.1.3.4 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As defined in A.3.1.2.1 |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | |
| RSRP Note 3 | dBm/15 KHz | -110 | |
| Io Note 3 | dBm/9 MHz | -70 | |
| Propagation Condition | - | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.13.1-2: RACH-Configuration parameters for FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | | |
| preambleTransMax | n6 | | | | |
| maxHARQ-Msg3Tx | 4 | | | | |
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.13.1-3: PRACH-Configuration parameters for FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {23,37,47} | | | | Corresponding to {-117, -103, -93} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | | |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

## A.6.2.13.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.13.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received

by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause7.24.2.

#### A.6.2.13.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.13.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.13.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.13.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.13.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.13.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 2.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.14 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

### A.6.2.14.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Enhanced Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.14.1-1 and A.6.2.14.1-2.

**Table A.6.2.14.1-1: General test parameters for HD-FDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.21 FDD | As defined in A.3.2.1.21. |
| PDSCH parameters Note 2 | | R.12 HD-FDD | As defined in A.3.1.4.5 |
| MPDCCH parameters Note 2 | | R.8 HD-FDD | As defined in A.3.1.3.5 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.3 HD-FDD | As defined in A.3.1.2.3 |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | |
| RSRP Note 3 | dBm/15 KHz | -110 | |
| Io Note 3 | dBm/9 MHz | -70 | |
| Propagation Condition | - | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. |
| Note 2: | The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required. |
| Note 3: | Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. |

**Table A.6.2.14.1-2: RACH-Configuration parameters for HD-FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | | |
| preambleTransMax | n6 | | | | |
| maxHARQ-Msg3Tx | 4 | | | | |
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.14.1-3: PRACH-Configuration parameters for HD-FDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {23,37,47} | | | | Corresponding {-117, -103, -93} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | | |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

### A.6.2.14.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.2.14.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.14.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

#### A.6.2.14.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.14.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.14.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.14.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.14.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 2.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.15 E-UTRAN TDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage

### A.6.2.15.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Enhanced Coverage is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3 and Clause 7.24.2 in an AWGN model.

For this test a single cell is used. The test parameters are given in tables A.6.2.15.1-1 and A.6.2.15.1-2.

**Table A.6.2.15.1-1: General test parameters for TDD contention based random access test**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern Note 1 | | OP.11 TDD | As defined in A.3.2.2.11. |
| PDSCH parameters Note 2 | | R.18 TDD | As defined in A.3.1.4.6 |
| MPDCCH parameters Note 2 | | R.16 TDD | As defined in A.3.1.3.6 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As defined in A.3.1.2.2 |
| Special subframe configuration | - | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | - | 1 | As specified in table 4.2-2 in TS 36.211. |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |

| | | | |
|---|---|---|---|
| PDCCH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | |
| RSRP Note 3 | dBm/15 KHz | -110 | |
| Io Note 3 | dBm/9 MHz | -70 | |
| Propagation Condition | - | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.15.1-2: RACH-Configuration parameters for TDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| numberOfRA-Preambles | n52 | | | | |
| sizeOfRA-PreamblesGroupA | n52 | | | | No group B. |
| powerRampingStep | dB2 | | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | | |
| preambleTransMax | n6 | | | | |
| maxHARQ-Msg3Tx | 4 | | | | |
| rar-HoppingConfig | Off | | | | |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 | |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 | |
| PreambleMappingInfo {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} | |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

**Table A.6.2.15.1-3: PRACH-Configuration parameters for TDD contention based random access test**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {23,37,47} | | | | Corresponding to {-117, -103, -93} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | | |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.101 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** | |

| | | | | | |
|---|---|---|---|---|---|
| prach-ConfigIndex | 53 | 53 | 53 | 53 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 | |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 | |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 | |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 | |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 | |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 | |
| prach-HoppingConfig | Off | Off | Off | Off | |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

## A.6.2.15.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.15.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

### A.6.2.15.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.101 [5].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24.2.

### A.6.2.15.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

#### A.6.2.15.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.15.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.15.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.15.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 2.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

## A.6.2.16 Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage

### A.6.2.16.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Normal Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.16.1-1, A.6.2.16.1-2 and A.6.2.16.1-4.

**Table A.6.2.16.1-1: nCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | |

| | | | |
|---|---|---|---|
| NPDSCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.17 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 |
| NPDCCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.39 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.16.1-2 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 3 | |
| NRSRP Note 3 | dBm/15 kHz | -95 | |
| Io Note 3 | dBm/180 KHz | -82.45 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |

Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.16.1-2: eCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |

| | | |
|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.6.2.16.1-3: Void**

**Table A.6.2.16.1-4: NPRACH-Configuration parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH resource** | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {24, 39} | | | Corresponding to {-116, -101} dBm as defined in Table 9.1.4-1 |
| nprach-CP-Length | us66dot7 | | | |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTargetPower | dBm-112 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-Periodicity | ms40 | ms240 | ms1280 | |
| nprach-StartTime | ms8 | ms64 | ms512 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | |

## A.6.2.16.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.2.16.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 2 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.16.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.16.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.16.1-4 is reached.

#### A.6.2.16.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.16.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.16.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.16.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 0. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

## A.6.2.17 Contention Based Random Access Test for UE category NB1 UEs In-band mode in Enhanced Coverage

### A.6.2.17.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.17.1-1, A.6.2.17.1-2 and A.6.2.17.1-4.

**Table A.6.2.17.1-1: nCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | |
| NPDSCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.17 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 |
| NPDCCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.39 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |

| | | | |
|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.17.1-2 | |
| $\hat{E}_s/N_{oc}$ | dB | -12.5 | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | -12.5 | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 | |
| Io Note 3 | dBm/180KHz | -86.97 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |

Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 3: Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.17.1-2: eCell specific test parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s/N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

**Table A.6.2.17.1-3: Void**

**Table A.6.2.17.1-4: NPRACH-Configuration parameters for HD-FDD contention based random access test for UE category NB1 In-Band mode in Enhanced Coverage**

| Field | Value | Comment |
|---|---|---|
| **Parameters not per NPRACH resource** | | |
| RSRP-ThresholdsNPRACH-InfoList | {19, 40} | Corresponding to {-121, -100} dBm as defined in Table 9.1.4-1 |

| | | | | |
|---|---|---|---|---|
| nprach-CP-Length | us266dot7 | | | |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTarget Power | dBm-120 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-Periodicity | ms40 | ms240 | ms1280 | |
| nprach-StartTime | ms8 | ms64 | ms512 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | |

## A.6.2.17.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.17.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.17.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.17.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.17.1-4 is reached.

#### A.6.2.17.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.17.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.17.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.17.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level Sselection requirement is a prerequisite already assumed for testing the other NPRACH requirements.

# A.6.2.18 Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage

## A.6.2.18.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.18.1-1, A.6.2.18.1-2 and A.6.2.18.1-3.

**Table A.6.2.18.1-1: nCell specific test parameters for HD-FDD contention based random access on non-achor carrier test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| Anchor PRB location within eCell | - | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | |
| Non-anchor PRB location within eCell | | eCell1 $BW_{channel}$ 5MHz: 18<br>eCell1 $BW_{channel}$ 10MHz: 31 | |
| NPDSCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.17 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.15 HD-FDD | As defined in A.3.1.5.1 |
| NPDCCH parameters Note 2 | | eCell1 $BW_{channel}$ 5MHz: R.39 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.27 HD-FDD | As defined in A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.18.1-2 | |
| $\hat{E}_s / N_{oc}$ | dB | -12.5 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12.5 | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 | |
| Io Note 3 | dBm/180 KHz | -86.97 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |
| Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The | | | |

| | |
|---|---|
| | OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel. |
| Note 2: | The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required. |
| Note 3: | Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. |

**Table A.6.2.18.1-2: eCell specific test parameters for HD-FDD contention based random access on non-achor carrier test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern Note 1 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.6.2.18.1-3: NPRACH-Configuration parameters for HD-FDD contention based random access on non-anchor carrier test for UE category NB1 In-Band mode in Enhanced Coverage**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH resource** | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {19, 40} | | | Corresponding to {-121, -100} dBm as defined in Table 9.1.4-1 |
| nprach-CP-Length | us266dot7 | | | |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ( $P_{CMAX}$ ) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTarget Power | dBm-120 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-ProbabilityAnchor | zero | zero | zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |

| | | | | |
|---|---|---|---|---|
| nprach-Periodicity | ms40 | ms240 | ms1280 | |
| nprach-StartTime | ms8 | ms64 | ms512 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v1dot5 | v1dot5 | v1dot5 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 for further information on the parameters in this table. | | | | |

### A.6.2.18.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.2.18.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.18.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.18.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.18.1-3 is reached.

#### A.6.2.18.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.18.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.18.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.18.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources in non-anchor carrier and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

## A.6.2.19 TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in normal coverage

### A.6.2.19.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Normal Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.19.1-1, A.6.2.19.1-2 and A.6.2.19.1-3.

**Table A.6.2.19.1-1: nCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 10MHz: 30 | |
| NPDSCH parameters Note 2 | | R.15 NB-TDD | Specified in section A.3.1.5.7 |
| NPDCCH parameters Note 2 | | R.27 NB-TDD | Specified in section A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.19.1-2 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 3 | |
| NRSRP Note 3 | dBm/15 kHz | -95 | |
| Io Note 3 | dBm/180 KHz | -82.45 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |

Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.19.1-2: eCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |

| | | |
|---|---|---|
| Antenna Configuration | - | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.6.2.19.1-3: NPRACH-Configuration parameters for TDD contention based random access test for UE category NB1 In-Band mode in Normal Coverage**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH resource** | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {24, 39} | | | Corresponding to {-116, -101} dBm as defined in Table 9.1.4-1 |
| nprach-PreambleFormat | fmt-0 | | | See TS 36.211 section 10.1.6 |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTargetPower | dBm-112 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-Periodicity | ms80 | ms640 | ms5120 | |
| nprach-StartTime | ms10 | ms80 | ms640 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | |

## A.6.2.19.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.19.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 2 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.19.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.19.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.19.1-3 is reached.

#### A.6.2.19.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.19.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.19.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

### A.6.2.19.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 0. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

## A.6.2.20 TDD Contention Based Random Access Test for UE category NB1 UEs In-band mode in enhanced coverage

### A.6.2.20.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.20.1-1, A.6.2.20.1-2 and A.6.2.20.1-3.

**Table A.6.2.20.1-1: nCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 10MHz: 30 | |
| NPDSCH parameters Note 2 | | R.15 NB-TDD | Specified in section A.3.1.5.7 |
| NPDCCH parameters Note 2 | | R.27 NB-TDD | Specified in section A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.20.1-2 | |
| $\hat{E}_s / N_{oc}$ | dB | -12.5 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12.5 | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 | |
| Io Note 3 | dBm/180 KHz | -86.97 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |

Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.20.1-2: eCell specific test parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

**Table A.6.2.20.1-3: NPRACH-Configuration parameters for TDD contention based random access test for UE category NB1 In-Band mode in Enhanced coverage**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH resource** | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {24, 39} | | | Corresponding to {-116, -101} dBm as defined in Table 9.1.4-1 |
| nprach-PreambleFormat | fmt-0 | | | See TS 36.211 section 10.1.6 |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-Periodicity | ms80 | ms640 | ms5120 | |
| nprach-StartTime | ms10 | ms80 | ms640 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |

| | | | | |
|---|---|---|---|---|
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | |

### A.6.2.20.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.2.20.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 2 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5F.2 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.20.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.20.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.20.1-3 is reached.

#### A.6.2.20.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.20.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.20.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.20.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level Sselection requirement is a prerequisite already assumed for testing the other NPRACH requirements.

## A.6.2.21 TDD Contention Based Random Access on Non-anchor Carrier Test for UE category NB1 UEs In-band mode in Enhanced Coverage

### A.6.2.21.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a category NB1 UE in Enhanced Coverage is according to the requirements, whether the NPRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the NRSRP measurement and the configured criterion in NRSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.6.2, Clause 6.6.3 and Clause 7.20.2 in an AWGN model.

For this test a single NB-IoT cell and a single LTE cell are used. The test parameters are given in tables A.6.2.21.1-1, A.6.2.21.1-2 and A.6.2.21.1-3.

**Table A.6.2.21.1-1: nCell specific test parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value | Comments |
|---|---|---|---|
| NB-IOT operational mode | | In-band | |
| $BW_{channel}$ | kHz | 200 | |
| PRB location within eCell | - | eCell1 $BW_{channel}$ 10MHz: 30 | |

| | | | |
|---|---|---|---|
| NPDSCH parameters Note 2 | | R.15 NB-TDD | Specified in section A.3.1.5.7 |
| NPDCCH parameters Note 2 | | R.27 NB-TDD | Specified in section A.3.1.6.1 |
| NPBCH_RA | dB | -3 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA Note 1 | dB | | |
| NOCNG_RB Note 1 | dB | | |
| DRX | | OFF | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.6.2.21.1-2 | |
| $\hat{E}_s / N_{oc}$ | dB | -12.5 | |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12.5 | |
| NRSRP Note 3 | dBm/15 kHz | -110.5 | |
| Io Note 3 | dBm/180 KHz | -86.97 | |
| Propagation Condition | - | AWGN | |
| Antenna Configuration | | 2x1 | |

Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The NPDSCH and NPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: Es/Iot, NRSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves.

**Table A.6.2.21.1-2: eCell specific test parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage**

| Parameter | Unit | Value |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern Note 1 | - | NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Propagation Condition | - | AWGN |
| Antenna Configuration | - | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

**Table A.6.2.21.1-3: NPRACH-Configuration parameters for TDD contention based random access on non-anchor test for UE category NB1 In-Band mode in Enhanced Coverage**

| Field | Value | | | Comment |
|---|---|---|---|---|
| **Parameters not per NPRACH resource** | | | | |
| RSRP-ThresholdsNPRACH-InfoList | {24, 39} | | | Corresponding to {-116, -101} dBm as defined in Table 9.1.4-1 |
| nprach-PreambleFormat | fmt-0 | | | See TS 36.211 section 10.1.6 |
| nrs-Power | -5 dBm/15 kHz | | | As defined in clause 6.7.3 in TS 36.331. |
| Backoff Parameter Index | 1 | | | As defined in table 7.2-2 in TS 36.321 |
| Configured UE transmitted power ($P_{CMAX}$) | 23 dBm for power class 3,<br>20 dBm for power class 5,<br>14 dBm for power class 6 | | | As defined in clause 6.2.5F in TS 36.101 |
| powerRampingStep | dB2 | | | |
| preambleInitialReceivedTargetPower | dBm-120 | | | |
| preambleTransMax-CE | n6 | | | |
| **Parameters per NPRACH Resource** | | | | |
| ***NPRACH Resource*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | |
| nprach-Periodicity | ms80 | ms640 | ms5120 | |
| nprach-StartTime | ms10 | ms80 | ms640 | |
| nprach-SubcarrierOffset | n0 | n0 | n0 | |
| nprach-NumSubcarriers | n12 | n12 | n12 | |
| nprach-SubcarrierMSG3-RangeStart | zero | zero | zero | |
| maxNumPreambleAttemptCE | n3 | n6 | n10 | |
| numRepetitionsPerPreambleAttempt | n2 | n8 | n64 | |
| npdcch-NumRepetitions-RA | r4 | r16 | r128 | |
| npdcch-StartSF-CSS-RA | v4 | v4 | v4 | |
| npdcch-Offset-RA | zero | zero | Zero | |
| nprach-NumCBRA-StartSubcarriers | n8 | n8 | n8 | |
| ra-ResponseWindowSize (per NPRACH Resource) | pp2 | pp2 | pp2 | |
| mac-ContentionResolutionTimer (per NPRACH Resource) | pp8 | pp8 | pp8 | |
| Note 1: See Clause 6.7.3 in TS 36.331 [2] for further information on the parameters in this table. | | | | |

## A.6.2.21.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

### A.6.2.21.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.6.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.21.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.6.2. The power of the first preamble shall be 23 dBm for power class 3, 20 dBm for power class 5 and 14 dBm for power class 6 with an accuracy specified in clause 6.3.5F.1.1 of TS 36.101 [5].

The transmit timing of all NPRACH transmissions shall be within the accuracy specified in Subclause 7.20.2.

#### A.6.2.21.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.6.2.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of re-transmissions defined by *maxNumPreambleAttemptCE* in the table A.6.2.21.1-3 is reached.

#### A.6.2.21.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

#### A.6.2.21.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.6.2.4, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

#### A.6.2.21.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.6.2.5, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated NPRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.6.2.21.2.7 NPRACH Resource Selection

The UE shall select NPRACH resources in non-anchor carrier and transmits or re- transmits NPRACH preambles using the NPRACH resources and NPRACH configuration corresponding to the coverage enhancement level 1. The rate of correct coverage enhancement level selection during repeated tests shall be at least 90%.

Note: Correct coverage enhancement level selection is a prerequisite for testing the other NPRACH requirements.

## A.6.3 RRC Connection Release with Redirection

### A.6.3.1 Redirection from E-UTRAN FDD to UTRAN FDD

#### A.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.1.1-1, A.6.3.1.1-2 and A.6.3.1.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The "*RRCConnectionRelease*" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

**Table A.6.3.1.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN FDD to UTRAN FDD under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| UTRA FDD cell list size | | 16 | UTRA cells on UTRA RF channel 1 provided in the "*RRCConnectionRelease*" message from the E-UTRAN |
| T1 | s | ≤5 | |
| T2 | s | 1 | |

**Table A.6.3.1.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |

| | | | |
|---|---|---|---|
| PSS_RA | dB | 0 | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.1.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T1 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io Note 3 | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: This gives an SCH Ec/Io of -15dB

## A.6.3.1.2 Test Requirements

The UE shall start to transmit random access to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRAN FDD observed during repeated tests shall be at least 90%.

NOTE: The Re-establishment delay in this case can be expressed as

$$T_{connection_release_redirect_UTRA\ FDD} = T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ FDD} + T_{SI\text{-}UTRA\ FDD} + T_{RA}$$

where

$T_{RRC_procedure_delay}$ = 110 ms

$T_{identify\text{-}UTRA\ FDD}$ = 500 ms

$T_{SI\text{-}UTRA\ FDD}$ = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. 0 ms is assumed in this test case.

$T_{RA}$ = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 650 ms.

## A.6.3.2 Redirection from E-UTRAN TDD to UTRAN FDD

### A.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.2.1-1, A.6.3.2.1-2 and A.6.3.2.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The "*RRCConnectionRelease*" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of cell 2. Cell 2 is powered up at the beginning of the T2,

**Table A.6.3.2.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN TDD to UTRAN FDD under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| UTRA FDD cell list size | | 16 | UTRA cells on UTRA RF channel 1 provided in the "*RRCConnectionRelease*" message from the E-UTRAN |
| T1 | s | ≤5 | |
| T2 | s | 1 | |

**Table A.6.3.2.1-2: Cell specific test parameters for cell #1 E-UTRAN TDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.2.1-3: Cell specific test parameters for cell #2 E-UTRAN TDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io Note 3 | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: This gives an SCH Ec/Io of -15dB

## A.6.3.2.2 Test Requirements

The UE shall start to transmit random access to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA FDD observed during repeated tests shall be at least 90%.

NOTE: The Re-establishment delay in this case can be expressed as

$$T_{connection_release_redirect_UTRA\ FDD} = T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ FDD} + T_{SI\text{-}UTRA\ FDD} + T_{RA}$$

where

$T_{RRC_procedure_delay}$ = 110 ms

$T_{identify\text{-}UTRA\ FDD}$ = 500 ms

$T_{SI\text{-}UTRA\ FDD}$ = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. 0 ms is assumed in this test case.

$T_{RA}$ = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 650 ms.

## A.6.3.3 Redirection from E-UTRAN FDD to GERAN when System Information is provided

### A.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target GERAN cell within $T_{connection_release_redirect_GERAN}$. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.3.1-1, A.6.3.3.1-2 and A.6.3.3.1-3 below. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall contain all the relevant system information of cell 2.

**Table A.6.3.3.1-1: General test parameters for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbour including ARFCN 1 | GSM cells are provided in the "*RRCConnectionRelease*" message. |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.6.3.3.1-2: Cell specific test parameters for E-UTRA FDD cell (cell #1) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| BWchannel | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |

| | | | |
|---|---|---|---|
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RANote 1 | dB | | |
| OCNG_RBNote 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | |
| Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.6.3.3.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

## A.6.3.3.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 1120 ms from the beginning of time period T2.

The rate of correct "RRC connection release with redirection to GERAN" observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{connection_release_redirect_\ GERAN} = T_{RRC_procedure_delay} + T_{identify\text{-}GERAN} + T_{SI\text{-}GERAN} + T_{RA}$

$T_{RRC_procedure_delay}$ = 110 ms, which is the time for processing the received message "*RRCConnectionRelease*.

$T_{identify\text{-}GERAN}$ = 1000 ms, which is the time for identifying the target GERAN cell.

$T_{SI\text{-}GERAN}$ = 0; UE does not have to read the system information of the GERAN cell since all relevant SI is provided to the UE in the "*RRCConnectionRelease"* message.

$T_{RA}$ = 10 ms, which is about 2 GSM frames (2*4.65 ms) to account for the GSM timing uncertainty.

## A.6.3.4 Redirection from E-UTRAN TDD to GERAN when System Information is provided

### A.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target GERAN cell within $T_{connection_release_redirect_GERAN}$. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.4.1-1, A.6.3.4.1-2 and A.6.3.4.1-3 below. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall contain all the relevant system information of cell 2.

**Table A.6.3.4.1-1: General test parameters for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| Special subframe configuration | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbour including ARFCN 1 | GSM cells provided in the "*RRCConnectionRelease*" message. |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.6.3.4.1-2: Cell specific test parameters for E-UTRA TDD cell (cell #1) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |

| | | | |
|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | |
| Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.6.3.4.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

### A.6.3.4.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 1120 ms from the beginning of time period T2.

The rate of correct "RRC connection release with redirection to GERAN" observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{connection_release_redirect_GERAN} = T_{RRC_procedure_delay} + T_{identify\text{-}GERAN} + T_{SI\text{-}GERAN} + T_{RA}$

$T_{RRC_procedure_delay}$ = 110 ms, which is the time for processing the received message "*RRCConnectionRelease*.

$T_{identify\text{-}GERAN}$ = 1000 ms, which is the time for identifying the target GERAN cell.

## A.6.3.5 E-UTRA TDD RRC connection release redirection to UTRA TDD

### A.6.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target UTRA TDD cell within $T_{connection_release_redirect_UTRA\ TDD}$. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.5.1-1, table A.6.3.5.1-2, and table A.6.3.5.1-3. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The "*RRCConnectionRelease*" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall contain all the relevant system information of Cell 2.

**Table A.6.3.5.1-1: General test parameters for E-UTRA TDD RRC connection release redirection to UTRA TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | Applicable to cell 1 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2-2 in TS 36.211 |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | 16 | UTRA cells on UTRA RF channel 1 provided in the "*RRCConnectionRelease*" message from the E-UTRAN |
| T1 | s | 5 | |
| T2 | s | 1 | |

**Table A.6.3.5.1-2: Cell specific test parameters for cell 1 in E-UTRA TDD RRC connection release redirection to UTRA TDD test**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.5.1-3: Cell specific test parameters for cell 2 in E-UTRA TDD RRC connection release redirection to UTRA TDD test**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number[Note1] | | Channel 1 | | | |
| PCCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior[Note2] | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP [Note3] | dBm | -inf | -76.77 | n.a. | n.a. |
| PCCPCH_Ec/Io [Note3] | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io [Note3] | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.3.5.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: $T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ TDD} + T_{SI\text{-}UTRA\ TDD} + T_{RA}$, where:

$T_{RRC_procedure_delay}$ = 110 ms, which is specified in clause 6.3.2.3.

$T_{identify\text{-}UTRA\ TDD}$ = 500 ms; which is defined in clause 6.3.2.3.

$T_{SI\text{-}UTRA\ TDD}$ = 0 ms, UE does not have to read the system information of the UTRAN TDD since all relevant SI is provided to the UE in the "*RRCConnectionRelease*" message.

$T_{RA}$ = 40ms. This is the additional delay caused by the random access procedure

It gives a total delay of 650 ms.

# A.6.3.6 E-UTRA FDD RRC connection release redirection to UTRA TDD

## A.6.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target UTRA TDD cell within $T_{connection_release_redirect_UTRA\ TDD}$. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.6.1-1, table A.6.3.6.1-2, and table A.6.3.6.1-3. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The "*RRCConnectionRelease*" message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall contain all the relevant system information of Cell 2.

**Table A.6.3.6.1-1: General test parameters for E-UTRA FDD RRC connection release redirection to UTRA TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | 16 | UTRA cells on UTRA RF channel 1 provided in the "*RRCConnectionRelease*" message from the E-UTRAN |
| T1 | s | 5 | |
| T2 | s | 1 | |

**Table A.6.3.6.1-2: Cell specific test parameters for cell 1 in E-UTRA FDD RRC connection release redirection to UTRA TDD test**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |

| | | | |
|---|---|---|---|
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.6.1-3: Cell specific test parameters for cell 2 in E-UTRA FDD RRC connection release redirection to UTRA TDD test**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number Note1 | | Channel 1 | | | |
| PCCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior Note2 | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | n.a. | n.a. |
| PCCPCH_Ec/Io Note3 | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io Note3 | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A. 6.3.6.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 650 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: $T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ TDD} + T_{SI\text{-}UTRA\ TDD} + T_{RA}$, where:

$T_{RRC_procedure_delay}$ = 110 ms, which is specified in clause 6.3.2.3.

$T_{identify\text{-}UTRA\ TDD}$ = 500 ms; which is defined in clause 6.3.2.3.

$T_{SI\text{-}UTRA\ TDD}$ = 0 ms, UE does not have to read the system information of the UTRAN TDD since all relevant SI is provided to the UE in the "*RRCConnectionRelease*" message.

$T_{RA}$ = 40ms. This is the additional delay caused by the random access procedure.

This gives a total delay of 650 ms.

## A.6.3.7 E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided

### A.6.3.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target UTRA TDD cell within $T_{connection_release_redirect_UTRA\ TDD}$. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.7.1-1, table A.6.3.7.1-2, and table A.6.3.7.1-3. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The "*RRCConnectionRelease*" message not containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from Cell 1.

**Table A.6.3.7.1-1: General test parameters for E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | Applicable to cell 1 |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | none | No explicit neighbour list is provided to the UE |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.6.3.7.1-2: Cell specific test parameters for cell 1 in E-UTRA TDD RRC connection release redirection to UTRA TDD test without SI provided**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |

| | | | |
|---|---|---|---|
| PHICH_RB | dB | 0 | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.7.1-3: Cell specific test parameters for cell 2 in E-UTRA TDD RRC connection release redirection to UTRA TDD test without SI provided**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number Note1 | | Channel 1 | | | |
| PCCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior Note2 | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | n.a. | n.a. |
| PCCPCH_Ec/Io Note3 | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io Note3 | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.3.7.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: $T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ TDD} + T_{SI\text{-}UTRA\ TDD} + T_{RA}$, where:

$T_{RRC_procedure_delay}$ = 110 ms, which is specified in clause 6.3.2.3.

$T_{identify\text{-}UTRA\ TDD}$ = 500 ms; which is defined in clause 6.3.2.3.

$T_{SI\text{-}UTRA\ TDD}$: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRA TDD cell. 1280 ms is assumed in this test case.

$T_{RA}$ = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.

## A.6.3.8 E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided

### A.6.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target UTRA TDD cell within $T_{connection_release_redirect_UTRA\ TDD}$. This test will partly verify the RRC connection release with redirection to UTRA TDD requirements in clause 6.3.2.3.

The test parameters are given in table A.6.3.8.1-1, table A.6.3.8.1-2, and table A.6.3.8.1-3. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The "*RRCConnectionRelease*" message not containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from Cell 1.

**Table A.6.3.8.1-1: General test parameters for E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | Applicable to cell 1 |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | none | No explicit neighbour list is provided to the UE |
| T1 | S | 5 | |
| T2 | S | 2 | |

**Table A.6.3.8.1-2: Cell specific test parameters for cell 1 in E-UTRA FDD RRC connection release redirection to UTRA TDD test without SI provided**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |

| | | | |
|---|---|---|---|
| PCFICH_RB | dB | 0 | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.8.1-3: Cell specific test parameters for cell 2 in E-UTRA FDD RRC connection release redirection to UTRA TDD test without SI provided**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number Note1 | | Channel 1 | | | |
| PCCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior Note2 | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP Note3 | dBm | -inf | -76.77 | n.a. | n.a. |
| PCCPCH_Ec/Io Note3 | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io Note3 | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.3.8.2 Test Requirements

The UE shall start to transmit the SYNCH-UL sequence in the UpPTS to Cell 2 less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRA TDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: $T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ TDD} + T_{SI\text{-}UTRA\ TDD} + T_{RA}$, where:

$T_{RRC_procedure_delay}$ = 110 ms, which is specified in clause 6.3.2.3.

$T_{identify\text{-}UTRA\ TDD}$ = 500 ms; which is defined in clause 6.3.2.3.

$T_{SI\text{-}UTRA\ TDD}$: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRA TDD cell. 1280 ms is assumed in this test case.

$T_{RA}$ = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.

## A.6.3.9 Redirection from E-UTRAN FDD to UTRAN FDD without System Information

### A.6.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct performing the RRC connection release with redirection to the target UTRAN FDD cell. This test will partly verify the RRC connection release with redirection to UTRAN FDD cell requirements in clause 6.3.2.1.

The test parameters are given in Tables A.6.3.9.1-1, A.6.3.9.1-2 and A.6.3.9.1-3 below. The test consists of two successive time periods, with time duration of T1, and T2 respectively. The "*RRCConnectionRelease*" message not containing any system information of Cell 2 shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

**Table A.6.3.9.1-1: General test parameters for RRC Connection Release with Redirection from E-UTRAN FDD to UTRAN FDD under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| UTRA FDD cell list size | | None | No explicit neighbour list is provided to the UE |
| T1 | s | ≤5 | |
| T2 | s | 2 | |

**Table A.6.3.9.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |

| | | | |
|---|---|---|---|
| PCFICH_RB | dB | 0 | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.9.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD to UTRAN FDD RRC release with redirection under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T1 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io Note 3 | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: This gives an SCH Ec/Io of -15dB

## A.6.3.9.2 Test Requirements

The UE shall start to send random access to the target UTRA FDD cell (Cell 2) less than 1930 ms from the beginning of time period T2.

The rate of correct "RRC connection release with redirection to UTRAN" observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this case can be expressed as

$$T_{connection_release_redirect_UTRA\ FDD} = T_{RRC_procedure_delay} + T_{identify\text{-}UTRA\ FDD} + T_{SI\text{-}UTRA\ FDD} + T_{RA}$$

where

$T_{RRC_procedure_delay}$ = 110 ms

$T_{identify\text{-}UTRA\ FDD}$ = 500 ms

$T_{SI\text{-}UTRA\ FDD}$ = the time required for acquiring all the relevant system information of the target UTRA FDD cell. This time depends upon whether the UE is provided with the relevant system information of the target UTRA FDD cell or not by the E-UTRAN before the RRC connection is released. Since no SI is provided, 1280 ms is assumed in this test case.

$T_{RA}$ = The additional delay caused by the random access procedure. 40 ms is assumed in this test case.

This gives a total of 1930 ms.

## A.6.3.10 Redirection from E-UTRAN FDD to GERAN when System Information is not provided

### A.6.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA FDD to the target GERAN cell within $T_{connection_release_redirect_GERAN}$. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.10.1-1, A.6.3.10.1-2 and A.6.3.10.1-3 below. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall not contain any system information of cell 2.

**Table A.6.3.10.1-1: General test parameters for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbour including ARFCN 1 | Only the list of GERAN carrier frequencies is provided in the "*RRCConnectionRelease*" message. |
| T1 | s | ≤5 | |
| T2 | s | 4 | |

**Table A.6.3.10.1-2: Cell specific test parameters for E-UTRA FDD cell (cell #1) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |

| | | | |
|---|---|---|---|
| PSS_RA | dB | 0 | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.6.3.10.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN FDD to GERAN in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

## A.6.3.10.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 3020 ms from the beginning of time period T2.

The rate of correct "RRC connection release with redirection to GERAN" observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{connection_release_redirect_\ GERAN} = T_{RRC_procedure_delay} + T_{identify\text{-}GERAN} + T_{SI\text{-}GERAN} + T_{RA}$

$T_{RRC_procedure_delay}$ = 110 ms, which is the time for processing the received message "*RRCConnectionRelease*.

$T_{identify\text{-}GERAN}$ = 1000 ms, which is the time for identifying the target GERAN cell.

$T_{SI\text{-}GERAN}$ = 1900 ms, which is the maximum time allowed to read BCCH data from the target GERAN cell.

$T_{RA}$ = 10 ms, which is about 2 GSM frames (2*4.65 ms) to account for the GSM timing uncertainty.

# A.6.3.11 Redirection from E-UTRAN TDD to GERAN when System Information is not provided

## A.6.3.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRA TDD to the target GERAN cell within $T_{connection_release_redirect_GERAN}$. This test will partly verify the RRC connection release with redirection to GERAN requirements in clause 6.3.2.2.

The test parameters are given in Tables A.6.3.11.1-1, A.6.3.11.1-2 and A.6.3.11.1-3 below. No measurement gaps are configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from cell 1. The "*RRCConnectionRelease*" message shall not contain any system information of cell 2.

**Table A.6.3.11.1-1: General test parameters for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| Special subframe configuration | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbour including ARFCN 1 | Only the list of GERAN carrier frequencies is provided in the "*RRCConnectionRelease*" message. |
| T1 | s | ≤5 | |
| T2 | s | 4 | |

**Table A.6.3.11.1-2: Cell specific test parameters for E-UTRA TDD cell (cell #1) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |

| | | | |
|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.6.3.11.1-3: Cell specific test parameters for GERAN cell (cell #2) for RRC connection release with redirection from E-UTRAN TDD to GERAN in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

### A.6.3.11.2 Test Requirements

The UE shall begin to send access bursts on RACH of the target GERAN cell (cell #2) less than 3020 ms from the beginning of time period T2.

The rate of correct "RRC connection release with redirection to GERAN" observed during repeated tests shall be at least 90%.

NOTE: The test requirement in this test case is expressed as:

$T_{connection_release_redirect_\ GERAN} = T_{RRC_procedure_delay} + T_{identify\text{-}GERAN} + T_{SI\text{-}GERAN} + T_{RA}$

$T_{RRC_procedure_delay}$ = 110 ms, which is the time for processing the received message "*RRCConnectionRelease.*

$T_{identify\text{-}GERAN}$ = 1000 ms, which is the time for identifying the target GERAN cell.

$T_{SI\text{-}GERAN}$ = 1900 ms, which is the maximum time allowed to read BCCH data from the target GERAN cell.

$T_{RA}$ = 10 ms, which is about 2 GSM frames (2*4.65 ms) to account for the GSM timing uncertainty.

## A.6.3.12 E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided

### A.6.3.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE performs the RRC connection release with redirection from the E-UTRAN TDD to the target UTRAN FDD cell within $T_{connection_release_redirect_UTRAN\ FDD}$. This test will partly verify the RRC connection release with redirection to UTRAN FDD requirements in clause 6.3.2.1.

The test parameters are given in table A.6.3.12.1-1, table A.6.3.12.1-2, and table A.6.3.12.1-3. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. The "*RRCConnectionRelease*" message not containing any system information of Cell 2 shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message, "*RRCConnectionRelease*", is received by the UE from Cell 1.

**Table A.6.3.12.1-1: General test parameters for E-UTRAN TDD RRC connection release redirection to UTRAN FDD without SI provided**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRAN RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRAN RF channel number 1. |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN TDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length | | Normal | Applicable to cell 1 |
| UTRAN RF Channel Number | | 1 | One UTRAN TDD carrier frequency is used. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRAN FDD cell list size | | None | No explicit neighbour list is provided to the UE |
| T1 | s | ≤5 | |
| T2 | s | 2 | |

**Table A.6.3.12.1-2: Cell specific test parameters for cell 1 in E-UTRAN TDD RRC connection release redirection to UTRAN FDD test without SI provided**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRAN RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.6.3.12.1-3: Cell specific test parameters for cell 2 in E-UTRAN TDD RRC connection release redirection to UTRAN FDD test without SI provided**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T1 |
| UTRAN RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io[Note 3] | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: This gives an SCH Ec/Io of -15dB

## A.6.3.12.2 Test Requirements

The UE shall start to send random access to the target UTRAN FDD cell (Cell 2) less than 1930 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to UTRAN FDD observed during repeated tests shall be at least 90%.

NOTE: The time delay can be expressed as: $T_{RRC_procedure_delay} + T_{identify\text{-}UTRAN\ FDD} + T_{SI\text{-}UTRAN\ FDD} + T_{RA}$, where:

$T_{RRC_procedure_delay}$ = 110 ms, which is specified in clause 6.3.2.1.

$T_{identify\text{-}UTRAN\ FDD}$ = 500 ms; which is defined in clause 6.3.2.1.

$T_{SI\text{-}UTRAN\ FDD}$: Maximum repetition period of relevant system info blocks that need to be received by the UE during RRC connection release redirection to UTRAN FDD cell. 1280 ms is assumed in this test case.

$T_{RA}$ = 40ms, this is the additional delay caused by the random access procedure.

This gives a total delay of 1930 ms.

# A.7 Timing and Signalling Characteristics

## A.7.1 UE Transmit Timing

### A.7.1.1 E-UTRAN FDD – UE Transmit Timing Accuracy Tests

#### A.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

For this test a single cell is used. Table A.7.1.1.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.1.1-2.

**Table A.7.1.1.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 | Test 4 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 1.4 | 10 |
| DRX cycle | ms | N/A | 80[Note5] | N/A | 640[Note5] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1] | | R.6 FDD | R.6 FDD | R.8 FDD | R.6 FDD |
| OCNG Pattern[Note2] | | OP.2 FDD | OP.2 FDD | OP.4 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA[Note3] | | | | | |
| OCNG_RB[Note3] | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 | -65.5 | N/A | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | -74.7 | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.1.1-3.

**Table A.7.1.1.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN FDD**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Test 4 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw7 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc1 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | 77 | 0 | 317 | SRS periodicity of 2ms, 80 ms and 320ms for Test 1, 2 and 4, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | | | |

**Table A.7.1.1.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 4 for E-UTRAN FDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 4 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

## A.7.1.1.2 Test Requirements

For parameters specified in Tables A.7.1.1.1-1 and A.7.1.1.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 4, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 4) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 4.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 4 the UE transmit

timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

For the 1.4MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for non-DRX (Test 3):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+128 \times T_S$ (approximately +4μs) compared to that in (a).

c) The test system shall verify that the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

## A.7.1.2 E-UTRAN TDD - UE Transmit Timing Accuracy Tests

### A.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

For this test a single cell is used. Table A.7.1.2.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.2.1-2.

**Table A.7.1.2.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 | Test 4 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 1.4 | 10 |
| Special subframe configuration[Note1] | | 6 | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 | 1 |
| DRX cycle | ms | N/A | 80[Note7] | N/A | 640[Note7] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note3] | | R.6 TDD | R.6 TDD | R.8 TDD | R.6 TDD |
| OCNG Pattern[Note4] | | OP.2 TDD | OP.2 TDD | OP.4 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | 0 | 0 | 0 | 0 |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA[Note5] | | | | | |
| OCNG_RB[Note5] | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Io[Note6] | dBm/9 MHz | -65.5 | -65.5 | N/A | -65.5 |

| | | | | | |
|---|---|---|---|---|---|
| | dBm/1.08 MHz | N/A | N/A | -74.7 | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.2.1-3.

**Table A.7.1.2.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN TDD**

| Field | Value | | | | Comment |
|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Test 4 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw7 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 15 | 325 | SRS periodicity of 10, 80, 10 and 320 ms for Test 1, 2, 3 and 4 respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | | | |

**Table A.7.1.2.1-3: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 4 for E-UTRAN TDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 4 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf640 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

## A.7.1.2.2 Test Requirements

For parameters specified in Tables A.7.1.2.1-1 and A.7.1.2.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 4, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64\times T_S$ (for Test 1 and Test 2) or $+32\times T_S$ (for Test 4) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for test 2 and test 4.

d) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 4 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

For the 1.4MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for non-DRX (Test 3):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $(N_{TA} +624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+128\times T_S$ (approximately +4μs) compared to that in (a).

c) The test system shall verify that the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offset is within $(N_{TA} +624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

d) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} +624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

## A.7.1.3 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for SCell

### A.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. Both PCell and SCell are in the primary Timing Advance Group (pTAG). Table A.7.1.3.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.3.1-2.

**Table A.7.1.3.1-1: General test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | 2 | 2 | 2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | 20 | 20 | 20 | 20 | 20 |
| Active PCell | | Cell 1 | Cell 1 | Cell 1 | | | |
| Active SCell | | | | | Cell 2 | Cell 2 | Cell 2 |
| TAG configuration | | pTAG | pTAG | pTAG | pTAG | pTAG | pTAG |
| DRX cycle | ms | N/A | 80[Note5] | 640[Note5] | N/A | 80[Note5] | 640[Note5] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1] | | R.10 FDD | R.10 FDD | R.10 FDD | R.10 FDD | R.10 FDD | R.10 FDD |

| OCNG Pattern[Note2] | | OP.12 FDD | OP.12 FDD | OP.12 FDD | OP.12 FDD | OP.12 FDD | OP.12 FDD |
|---|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA[Note3]<br>OCNG_RB[Note3] | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| Io[Note4] | dBm/18 MHz | -62.5 | -62.5 | -62.5 | -62.5 | -62.5 | -62.5 |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Note 1: For the reference measurement channels, see clause A.3.1.<br>Note 2: For the OCNG pattern, see clause A.3.2.<br>Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 5: DRX related parameters are defined in Table A.7.1.3.1-3. | | | | | | | |

**Table A.7.1.3.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN FDD**

| Field | Cell 1 | | | Cell 2 | | | Comment |
|---|---|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc3 | sc1 | sc3 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | 77 | 317 | 0 | 77 | 317 | SRS periodicity of 2ms, 80 ms and 320ms for Test 1, 2 and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| srsAntennaPort | an1 | an1 | an1 | an1 | an1 | an1 | Number of SRS antenna ports |
| NOTE: For further information see clause 6.3.2 in TS 36.331. | | | | | | | |

**Table A.7.1.3.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN FDD**

| Field | Test 2 | | Test 3 | | Comment |
|---|---|---|---|---|---|
| | Cell 1 | Cell 2 | Cell 1 | Cell 2 | |
| onDurationTimer | psf1 | psf1 | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | psf1 | psf1 | |

| | | | | | |
|---|---|---|---|---|---|
| longDRX-CycleStartOffset | sf80 | sf80 | Sf640 | Sf640 | |
| shortDRX | disable | disable | disable | Disable | |
| NOTE: For further information see clause 6.3.2 in TS 36.331. | | | | | |

### A.7.1.3.2 Test Requirements

For parameters specified in Tables A.7.1.3.1-1, and A.7.1.3.1-2 the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test 1) and DRX with a cycle length of 80 ms or a cycle length of 640 mss(Test 2 and 3, respectively):

a) After the SCell (Cell 2) is activated, the test system shall verify that the UE transmit timing offsets of both PCell and SCell are within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1).

b) The test system adjusts the downlink transmit timing for the PCell (Cell 1) by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offsets of both PCell and SCell are within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1). Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offsets of both PCell and SCell stay within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1). For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.4 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell

### A.7.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. Both PCell and SCell are in the primary Timing Advance Group (pTAG). Table A.7.1.4.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.4.1-2.

**Table A.7.1.4.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | 2 | 2 | 2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | 20 | 20 | 20 | 20 | 20 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | 2 | 2 | 2 |
| Active PCell | | Cell 1 | Cell 1 | Cell 1 | | | |
| Active SCell | | | | | Cell 2 | Cell 2 | Cell 2 |
| TAG configuration | | pTAG | pTAG | pTAG | pTAG | pTAG | pTAG |
| Special subframe configuration[Note1] | | 6 | 6 | 6 | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 | 1 | 1 | 1 |
| DRX cycle | ms | OFF | 80[Note7] | 640[Note7] | OFF | 80[Note7] | 640[Note7] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note3] | | R.10 TDD | R.10 TDD | R.10 TDD | R.10 TDD | R.10 TDD | R.10 TDD |

| OCNG Pattern[Note4] | | OP.8 TDD | OP.8 TDD | OP.8 TDD | OP.8 TDD | OP.8 TDD | OP.8 TDD |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | 0 | 0 | 0 | | 0 | 0 |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA[Note5] | | | | | | | |
| OCNG_RB[Note5] | | | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| Io[Note6] | dBm/18 MHz | -62.5 | -62.5 | -62.5 | -62.5 | -62.5 | -62.5 |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.4.1-3.

**Table A.7.1.4.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN TDD**

| Field | Cell 1 | | | Cell 2 | | | Comment |
|---|---|---|---|---|---|---|---|
| Test 1 | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 | Tset3 Tset3 |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneous Transmission | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 325 | 15 | 85 | 325 | SRS periodicity of 10, 80 ms and 320ms for Test 1, 2 and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| srsAntennaPort | an1 | an1 | an1 | an1 | an1 | an1 | Number of SRS antenna ports |

Note: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.4.1-3: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN TDD**

| Field | Test 2 | Test 3 | Comment |
|---|---|---|---|

| | Cell 1 | Cell 2 | Cell 1 | Cell 2 | |
|---|---|---|---|---|---|
| onDurationTimer | psf1 | psf1 | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf80 | Sf640 | Sf640 | |
| shortDRX | disable | disable | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | | | |

### A.7.1.4.2 Test Requirements

For parameters specified in Tables A.7.1.4.1-1 and A.7.1.4.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test 1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Test 2 and 3, respectively):

a) After the SCell (Cell 2) is activated, the test system shall verify that the UE transmit timing offsets of both PCell and SCell are within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1).

b) The test system adjusts the downlink transmit timing for the PCell (Cell 1) by $+64\times T_S$ (for Test 1 and Test 2) or $+32\times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.1.2 until the UE transmit timing offsets of both PCell and SCell are within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1). Skip this step for test 2 and test 3.

d) The test system shall verify that the UE transmit timing offsets of both PCell and SCell stay within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of PCell (Cell 1). For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.4A E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell for 20 MHz + 10 MHz

### A.7.1.4A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.1.4.1.

The parameters of this test are the same as defined in Subclause A.7.1.4.1 except that the values of the parameters in the Table A.7.1.4A.1-1 will replace the values of the corresponding parameters in A.7.1.4.1-1. Parameters used for the sounding reference symbol configuration and DRX configuration are unchanged from table A.7.1.4.1-2 and table A.7.1.4.1-3.

**Table A.7.1.4A.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD for 20 MHz +10 MHz**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | 20 | 20 | 10 | 10 | 10 |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note3] | | R.10 TDD | R.10 TDD | R.10 TDD | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Pattern[Note4] | | OP.8 TDD | OP.8 TDD | OP.8 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| Io[Note6] | dBm/18 MHz | -62.5 | -62.5 | -62.5 | N/A | N/A | N/A |
| | dBm/9 MHz | N/A | N/A | N/A | -65.5 | -65.5 | -65.5 |

### A.7.1.4A.2 Test Requirements

The test requirements defined in section A.7.1.4.2 shall apply to this test case.

## A.7.1.5 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for 5MHz Bandwidth

### A.7.1.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.1.1.1.

The parameters of this test are the same as defined in Subclause A.7.1.1.1 except that the values of the parameters in Test 1 in the Table A.7.1.5.1-1 will replace the values of the corresponding parameters in A.7.1.1.1-1. Only Test 1 is defined for the 5MHz bandwidth.

**Table A.7.1.5.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD for 5MHz bandwidth**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1 | | R.11 FDD |
| OCNG Pattern Note2 | | OP.16 FDD |
| Io Note4 | dBm/4.5 MHz | -68.5 |
| Note 1: For the reference measurement channels, see clause A.3.1.<br>Note 2: For the OCNG pattern, see clause A.3.2.<br>Note 3: See Table A.7.1.1.1-1 for the other parameters.<br>Note 4: This test is according to the principle defined in section A.3.7.2. | | |

### A.7.1.5.2 Test Requirements

The test requirements defined in section A.7.1.1.2 shall apply to this test case.

## A.7.1.6 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for SCell in sTAG

### A.7.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits for SCell in sTAG. This test will verify the requirements in clause 7.1.2.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell is in the Primary Timing Advance Group (pTAG) and Scell is in the secondary Timing Advance Group (sTAG). Table A.7.1.6.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing for Scell in sTAG is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.6.1-2.

**Table A.7.1.6.1-1: General test Parameters for UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN FDD**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 | 10 |
| Active PCell | | Cell 1 | Cell 1 | | |
| Active SCell | | | | Cell 2 | Cell 2 |
| TAG configuration | | pTAG | pTAG | sTAG | sTAG |
| DRX cycle | ms | OFF | 80 Note5 | OFF | 80 Note5 |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1 | | R.6 FDD | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Pattern Note2 | | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA Note3 | | | | | |
| OCNG_RB Note3 | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Io Note4 | dBm/9 MHz | -65.5 | -65.5 | -65.5 | -65.5 |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.6.1-3.

**Table A.7.1.6.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN FDD**

| Field | Cell 1 | | Cell 2 | | Comment |
|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 1 | Test 2 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 15 | 85 | SRS periodicity of 10 and 80 ms for Test 1 and 2, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| srsAntennaPort | an1 | an1 | an1 | an1 | Number of SRS antenna ports |

Note: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.6.1-3: drx-Configuration to be used in Test 2 of UE Transmit Timing Accuracy for SCell in sTAG for E-UTRAN FDD**

| Field | Cell 1 | Cell 2 | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf80 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.6.2 Test Requirements

For parameters specified in Tables A.7.1.6.1-1, and A.7.1.6.1-2 the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate for Scell in sTAG shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

For Test1 and Test2, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX and DRX with a cycle length of 80 ms:

a) After the SCell (Cell 2) is activated, the test system shall verify that the UE transmit timing offsets for SCell in sTAG are within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated Scell.

b) The test system adjusts the downlink transmit timing for the activated Scell (Cell 2) by $+64 \times T_S$ (approximately +2μs) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate for Scell in sTAG shall be according to the requirements in clause 7.1.2 until the UE transmit timing offsets of SCell within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell (Cell 2). Skip this step for Test 2.

d) The test system shall verify that the UE transmit timing offsets of the SCell in sTAG stay within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell (Cell 2).

## A.7.1.7 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG

### A.7.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits for SCell in sTAG. This test will verify the requirements in clause 7.1.2.

For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell is in the Primary Timing Advance Group (pTAG) and Scell is in the secondary Timing Advance Group (sTAG). Table A.7.1.7.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing for Scell in sTAG is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.7.1-2.

**Table A.7.1.7.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN TDD**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 | 10 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 |
| Active PCell | | Cell 1 | Cell 1 | | |
| Active SCell | | | | Cell 2 | Cell 2 |

| TAG configuration | | pTAG | pTAG | sTAG | sTAG |
|---|---|---|---|---|---|
| Special subframe configuration[Note1] | | 6 | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 | 1 |
| DRX cycle | ms | OFF | 80[Note7] | OFF | 80[Note7] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note3] | | R.6 TDD | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Pattern[Note4] | | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | 0 | 0 | | 0 |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA[Note5] | | | | | |
| OCNG_RB[Note5] | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 |
| Io[Note6] | dBm/9 MHz | --65.5 | --65.5 | --65.5 | --65.5 |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.7.1-3.

**Table A.7.1.7.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN TDD**

| Field | Cell 1 | | Cell 2 | | Comment |
|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 1 | Test 2 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 15 | 85 | SRS periodicity of 10 and 80 ms for Test 1 and 2, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| srsAntennaPort | an1 | an1 | an1 | an1 | Number of SRS antenna ports |

Note: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.7.1-3: DRX Configuration to be used in Test 2 of UE Transmit Timing Accuracy for SCell in sTAG for E-UTRAN TDD**

| Field | Cell 1 | Cell 2 | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf80 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.7.2 Test Requirements

For parameters specified in Tables A.7.1.7.1-1 and A.7.1.7.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate for Scell in sTAG shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

For Test 1 and Test 2, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX and DRX with a cycle length of 80 ms:

a) After the SCell (Cell 2) is activated, the test system shall verify that the UE transmit timing offsets for Scell in sTAG are within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell (Cell 2).

b) The test system adjusts the downlink transmit timing for the activated Scell (Cell 2) by $+64\times T_S$ (approximately +2μs) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate for Scell in sTAG shall be according to the requirements in clause 7.1.2 until the UE transmit timing offsets of SCell are within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell(Cell 2). Skip this step for test 2.

d) The test system shall verify that the UE transmit timing offsets of the SCell in sTAG stay within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated Scell (Cell 2).

## A.7.1.7A E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG for 20MHz +20MHz

### A.7.1.7A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.1.7. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.7.1.7B.1.1-1 will replace the values of corresponding parameters in Tables A.7.1.7.1-1.

**Table A.7.1.7A.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN TDD with 20MHz +20MHz bandwidth**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | 20 | 20 | 20 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.10 TDD | R.10 TDD | R.10 TDD | R.10 TDD |
| OCNG Pattern defined in A.3.2.2 | | OP.8 TDD | OP.8 TDD | OP.8 TDD | OP.8 TDD |
| $Io^{Note1}$ | dBm/18 MHz | -62.5 | -62.5 | -62.5 | -62.5 |
| Note 1: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | | | |

### A.7.1.7A.2 Test Requirements

The test requirements defined in section A.7.1.7.2 shall apply to these test cases.

## A.7.1.7B E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG for 20MHz +10MHz

### A.7.1.7B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.1.7. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.7.1.7B.1-1 will replace the values of corresponding parameters in Tables A.7.1.7.1-1.

**Table A.7.1.7B.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for Scell in sTAG for E-UTRAN TDD with 20MHz +10MHz bandwidth**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | 20 | 10 | 10 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.10 TDD | R.10 TDD | R.6 TDD | R.6 TDD |
| OCNG Pattern defined in A.3.2.2 | | OP.8 TDD | OP.8 TDD | OP.2 TDD | OP.2 TDD |
| $Io^{Note1}$ | dBm/18 MHz | -62.5 | -62.5 | - | - |
| | dBm/9 MHz | - | - | -65.5 | -65.5 |
| Note 1: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | | | |

### A.7.1.7B.2 Test Requirements

The test requirements defined in section A.7.1.7.2 shall apply to these test cases.

## A.7.1.8 Void

### A.7.1.8.1 Void

**Table A.7.1.8.1-1: Void**

### A.7.1.8.2 Void

## A.7.1.9 Void

### A.7.1.9.1 Void

**Table A.7.1.9.1-1: Void**

### A.7.1.9.2 Void

## A.7.1.10 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeA

### A.7.1.10.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeA is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

For this test a single cell is used. Table A.7.1.10.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.10.1-2.

**Table A.7.1.10.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M1 UE under CEModeA**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| DRX cycle | ms | N/A | 80[Note5] | 640[Note5] |
| PRACH Configuration | | PRACH_4CE As specified in A.3.16 | | |
| MPDCCH Reference measurement channel[Note1] | | R.16 FDD | R.16 FDD | R.16 FDD |
| OCNG Pattern[Note2] | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |
| OCNG_RA[Note3] | | | | |
| OCNG_RB[Note3] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.10.1-3.

**Table A.7.1.10.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M1 UE under CEModeA**

| Field | Value | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | 77 | 317 | SRS periodicity of 2ms, 80 ms and 320ms for Test 1, 2 and 4, respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

Note 1: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.10.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN FDD Cat-M1 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.10.2 Test Requirements

For parameters specified in Tables A.7.1.10.1-1 and A.7.1.10.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 4, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.11 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeA

### A.7.1.11.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeA is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

For this test a single cell is used. Table A.7.1.11.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.11.1-2.

**Table A.7.1.11.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M1 UE under CEModeA**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| DRX cycle | ms | N/A | 80[Note5] | 640[Note5] |
| PRACH configuration | | PRACH_4CE As specified in A.3.16 | | |

| | | | | |
|---|---|---|---|---|
| MPDCCH Reference measurement channel[Note1] | | R.6 HD-FDD | R.6 HD-FDD | R. 6 HD-FDD |
| OCNG Pattern[Note2] | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |
| OCNG_RA[Note3] | | | | |
| OCNG_RB[Note3] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.11.1-3.

**Table A.7.1.11.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M1 UE under CEModeA**

| Field | Value | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 7 | 77 | 317 | SRS periodicity of 10ms, 80ms and 320ms for Test 1, 2 and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

Note 1: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.11.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN HD-FDD Cat-M1 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |

Note 1: For further information see clause 6.3.2 in TS 36.331.

### A.7.1.11.2 Test Requirements

For parameters specified in Tables A.7.1.11.1-1 and A.7.1.11.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 4, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 24 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.12 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeA

### A.7.1.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

For this test a single cell is used. Table A.7.1.12.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.12.1-2.

**Table A.7.1.12.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M1 UE under CEModeA**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 |
| DRX cycle | ms | N/A | 80[Note7] | 640[Note7] |
| PRACH configuration | | PRACH_4CE As specified in A.3.16 | | |
| MPDCCH Reference measurement channel[Note3] | | R.14 TDD | R.14 TDD | R.14 TDD |
| OCNG Pattern[Note4] | | OP.11 TDD | OP.11 TDD | OP.11 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | 0 | 0 | 0 |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RA[Note5]<br>OCNG_RB[Note5] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note6] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.12.1-3.

**Table A.7.1.12.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M1 UE under CEModeA**

| Field | Values | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | Bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| Duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 325 | SRS periodicity of 10, 80, 10 and 320 ms for Test 1, 2, 3 and 4 respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

**Table A.7.1.12.1-3: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN TDD Cat-M1 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf640 | |
| shortDRX | disable | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

## A.7.1.12.2 Test Requirements

For parameters specified in Tables A.7.1.12.1-1 and A.7.1.12.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 4, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64\times T_S$ (for Test 1 and Test 2) or $+32\times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for test 2 and test 3.

d) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + 624)\times T_S \pm 24\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.1.13 3DL/3UL TDD CA UE Transmit Timing Accuracy Tests for 2 SCells

## A.7.1.13.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits for SCell in sTAG. This test will verify the requirements in clause 7.1.2.

For this test three cells are used. Cell 1 is PCell, Cell 2 is SCell1 and Cell 3 is SCell2. PCell is in the Primary Timing Advance Group (pTAG) and SCell1 and SCell2 are in the secondary Timing Advance Group (sTAG). Table A.7.1.13.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing for SCell1 and SCell2 in sTAG is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.13.1-2.

**Table A.7.1.13.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for SCell1 and SCell2 in sTAG for 3DL/3UL TDD CAE-UTRAN TDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 1 | Test 2 | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 | 2 | 2 | 3 | 3 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5, 10, 20 | 5, 10, 20 | 5, 10, 20 | 5, 10, 20 | 5, 10, 20 | 5, 10, 20 |
| Active PCell | | Cell 1 | Cell 1 | | | | |
| Active SCell | | | | Cell 2 | Cell 2 | Cell 3 | Cell 3 |
| TAG configuration | | pTAG | pTAG | sTAG | sTAG | sTAG | sTAG |
| Special subframe configuration[Note1] | | 6 | 6 | 6 | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 | 1 | 1 | 1 |
| DRX cycle | ms | OFF | 80[Note7] | OFF | 80[Note7] | OFF | 80[Note7] |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note3] | | R.11 TDD , R.6 TDD, R.10 TDD | R.11 TDD , R.6 TDD, R.10 TDD | R.11 TDD , R.6 TDD, R.10 TDD | R.11 TDD , R.6 TDD, R.10 TDD | R.11 TDD , R.6 TDD, R.10 TDD | R.11 TDD , R.6 TDD, R.10 TDD |
| OCNG Pattern[Note4] | | OP.10 TDD , OP.2 TDD, OP.8 TDD | OP.10 TDD , OP.2 TDD, OP.8 TDD | OP.10 TDD , OP.2 TDD, OP.8 TDD | OP.10 TDD , OP.2 TDD, OP.8 TDD | OP.10 TDD , OP.2 TDD, OP.8 TDD | OP.10 TDD , OP.2 TDD, OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA[Note5]<br>OCNG_RB[Note5] | | | | | | | |
| $N_{oc}$ | dBm/ 15 kHz | -98 | -98 | -98 | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 | 3 | 3 | 3 |
| Io[Note6] | dBm/ 4.5 MHz | -68.5 | -68.5 | -68.5 | -68.5 | -68.5 | -68.5 |
| | dBm/ 9 MHz | --65.5 | --65.5 | --65.5 | --65.5 | --65.5 | --65.5 |
| | dBm/ 18MHz | -62.4 | -62.4 | -62.4 | -62.4 | -62.4 | -62.4 |
| Timing offset to Cell 1 | µs | - | | 0 | | 0 | |
| Time alignment error relative to cell 1 [Note 8] | µs | - | | ≤ TAE | | ≤ TAE | |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.x.1-3.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.7.1.13.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for SCell1 and SCell2 in sTAG for 3DL/3UL TDD CA**

| Field | Cell 1 | | Cell 2 | | Cell 3 | | Comment |
|---|---|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 1 | Test 2 | Test 1 | Test 2 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 15 | 85 | 15 | 85 | SRS periodicity of 10 and 80 ms for Test 1 and 2, respectively. |
| transmissionComb | 0 | 0 | 0 | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | cs0 | cs0 | cs0 | No cyclic shift |
| srsAntennaPort | an1 | an1 | an1 | an1 | an1 | an1 | Number of SRS antenna ports |

Note 1: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.13.1-3: DRX Configuration to be used in Test 2 of UE Transmit Timing Accuracy for SCell1 and SCell2 in sTAG for 3DL/3UL TDD CA**

| Field | Cell 1 | Cell 2 | Cell 3 | Comment |
|---|---|---|---|---|
| onDurationTimer | psf1 | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | psf1 | |

| | | | | |
|---|---|---|---|---|
| drx-RetransmissionTimer | psf1 | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf80 | sf80 | |
| shortDRX | disable | disable | Disable | |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | | | |

### A.7.1.13.2 Test Requirements

For parameters specified in Tables A.7.1.13.1-1, 7.1.8.1-2 and A.7.1.13.1-3, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate for Scell1 and SCell2 in sTAG shall be within the limits defined in clause 7.1.2.

The following sequence of events shall be used to verify that the requirements are met.

For Test 1 and Test 2, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX and DRX with a cycle length of 80 ms:

a) After the SCell1 (Cell 2) and SCell2 (Cell3) are activated, the test system shall verify that the UE transmit timing offsets for SCell1 and SCell2 in sTAG are within $(N_{TA} + 624) \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell1 (Cell 2) or SCell2 (Cell3).

b) The test system adjusts the downlink transmit timing for the activated SCell1 (Cell 2) and SCell2 (Cell3) by $+64 \times T_S$ (approximately +2μs) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate for SCell1 and SCell2 in sTAG shall be according to the requirements in clause 7.1.2 until the UE transmit timing offsets of SCell1 and SCell2 are within $(N_{TA} + 624) \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell1 (Cell 2) or SCell2 (Cell3). Skip this step for test 2.

d) The test system shall verify that the UE transmit timing offsets of the SCell1 and SCell2 in sTAG stay within $(N_{TA} + 624) \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of the activated SCell1 (Cell 2) or SCell2 (Cell3).

## A.7.1.14 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeB

### A.7.1.14.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

As specified in Clause 7.24.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.14.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.14.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M1 UE under CEModeB**

| Parameter | | Unit | Value | | |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| DRX cycle | | ms | N/A | 80[Note5] | 640[Note5] |
| MPDCCH Reference measurement channel[Note1] | | | R.18 FDD | R.18 FDD | R.18 FDD |
| OCNG Pattern[Note2] | | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| Number of repetitions | MPDCCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |

| | | | | |
|---|---|---|---|---|
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |
| OCNG_RA[Note3] | | | | |
| OCNG_RB[Note3] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 |
| Io[Note4] | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.14.1-2.

**Table A.7.1.14.1-2: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN FDD Cat-M1 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

## A.7.1.14.2 Test Requirements

For parameters specified in Tables A.7.1.14.1-1 and A.7.1.14.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.1.15 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeB

## A.7.1.15.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

As specified in Clause 7.24.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.15.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.15.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M1 UE under CEModeB**

| Parameter | | Unit | Value | | |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| DRX cycle | | ms | N/A | 80[Note5] | 640[Note5] |
| MPDCCH Reference measurement channel[Note1] | | | R.6 HD-FDD | R.6 HD-FDD | R. 6 HD-FDD |
| OCNG Pattern[Note2] | | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| Number of repetitions | MPDDCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA[Note3] | | | | | |
| OCNG_RB[Note3] | | | | | |
| $N_{oc}$ | | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 |
| Io[Note4] | | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.15.1-2.

**Table A.7.1.15.1-2: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN HD-FDD Cat-M1 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |

| | | | |
|---|---|---|---|
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.15.2 Test Requirements

For parameters specified in Tables A.7.1.15.1-1 and A.7.1.15.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.16 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for Cat-M1 UE in CEModeB

### A.7.1.16.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.24.2.

As specified in Clause 7.24.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.16.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.16.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M1 UE under CEModeB**

| Parameter | | Unit | Value | | |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| Special subframe configuration[Note1] | | | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | | 1 | 1 | 1 |
| DRX cycle | | ms | N/A | 80[Note7] | 640[Note7] |
| MPDCCH Reference measurement channel[Note3] | | | R.14 TDD | R.14 TDD | R.14 TDD |
| OCNG Pattern[Note4] | | | OP.11 TDD | OP.11 TDD | OP.11 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| Number of repetitions | MPDCCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RB | | | 0 | 0 | 0 |
| PSS_RA | | | | | |

| | | | | |
|---|---|---|---|---|
| SSS_RA<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA[Note5]<br>OCNG_RB[Note5] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -12 |
| Io[Note6] | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.16.1-2.

**Table A.7.1.16.1-2: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN TDD Cat-M1 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf640 | |
| shortDRX | disable | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

## A.7.1.16.2 Test Requirements

For parameters specified in Tables A.7.1.16.1-1 and A.7.1.16.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.24.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.24.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 48 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit

timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.1.17 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage

## A.7.1.17.1 Test Purpose and Environment

The purpose of this test is to verify that the Category NB1 UE under normal coverage is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.20.

For this test a single NB-IoT cell and a single LTE cell are used. Test parameters are given in Table A.7.1.17.1-1, Table A.7.1.17.1-2, and Table A.7.1.17.1-3. The transmit timing is verified by the UE transmitting NPUSCH.

**Table A.7.1.17.1-1: General Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| NB-IoT Operation mode | | In-band |
| DRX | | OFF |
| NPRACH configuration | | NPRACH.R-1<br>As specified in A.3.18 |
| NPDCCH repetition level | | 1 |
| npdcch-StartSF-USS Note 1 | | v8 |
| npdcch-NumRepetitions-r13 Note 1 | | r1 |
| NPUSCH repetition level | | 1 |
| Note 1: For further information see clause 6.7.3.2 in TS 36.331 [2]. | | |

**Table A.7.1.17.1-2: nCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| RF Channel Number | | 1 |
| $BW_{channel}$ | kHz | 200 |
| PRB location within eCell | | eCell $BW_{channel}$ 5MHz: 17<br>eCell $BW_{channel}$ 10MHz:30 |
| NPDSCH parameter | | eCell $BW_{channel}$ 5MHz: R.17 HD-FDD<br>eCell $BW_{channel}$ 10MHz: R.15 HD-FDD |
| NPDCCH parameter | | eCell $BW_{channel}$ 5MHz: R.41 HD-FDD<br>eCell $BW_{channel}$ 10MHz: R.29 HD-FDD |
| NPBCH_RA | dB | -3 |
| NPBCH_RB | | |
| NPSS_RA | | |
| NSSS_RA | | |
| NPDCCH_RA | | |
| NPDCCH_RB | | |
| NPDSCH_RA | | |
| NPDSCH_RB | | |
| NOCNG_RA Note1 | | |
| NOCNG_RB Note1 | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.1.17.1-3 |
| $\hat{E}_s / I_{ot}$ | dB | 4 |

| | | |
|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 4 |
| Antenna Configuration | | 2x1 |
| Propagation condition | - | AWGN |
| Note 1 NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.7.1.17.1-3: eCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | | |
| PSS_RA | | |
| SSS_RA | | |
| PCFICH_RB | | |
| PHICH_RA | | |
| PHICH_RB | | |
| PDCCH_RA | | |
| PDCCH_RB | | |
| OCNG_RA[Note1] | | |
| OCNG_RB[Note1] | | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s/N_{oc}$ | dB | 4 |
| Antenna configuration | | 2x1 |
| Propagation condition | - | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

## A.7.1.17.2 Test Requirements

For parameters specified in Tables A.7.1.17.1-1, A.7.1.17.1-2, and A.7.1.17.1-3, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.20.2.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED:

a) After a connection is set up with the cell, the test system sends NPDCCH including uplink grant for NPUSCH transmission and the test system shall measure the UE transmit timing offset ($n \times Ts$) and verify that it is within $T_e$ ($n \times Ts \leq N_{TA} \times T_S \pm 80 \times T_S$) with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

b) Using the value of n measured in a), the test system adjusts the downlink transmit timing for the cell:

- if $n < 0$, by $+(144 - |n|) \times T_S$ compared to that in (a).
- if $n \geq 0$, by $-(144 - |n|) \times T_S$ compared to that in (a).

The timing adjustment is performed monotonically in multiple steps of $|\Delta T| \leq 9 \times T_S$ per 256 ms ($\Delta T$ is to be defined in the test procedure) until the above required total timing change is achieved, during which no grant is transmitted for the UE.

c) Immediately after (b), the test system sends NPDCCH including uplink grant for NPUSCH transmission and immediately after receiving NPUSCH the test system repeatedly sends NPDCCH including uplink grant for NPUSCH transmission until the UE transmit timing offset is within $N_{TA}\times T_S \pm 80\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. The test system shall verify that the difference in timing between the first NPUSCH transmission in step c) and the NPUSCH transmission in step a) shall be not greater than the maximum amount of the magnitude of the timing change in one adjustment requirement in clause 7.20.2. Using the first NPUSCH transmission in step c) and subsequent NPUSCH transmissions. The test system shall verify that the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.20.2 until the UE transmit timing offset is within $N_{TA}\times T_S \pm 80\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

d) The test system the test system sends NPDCCH including uplink grant for NPUSCH transmission and shall verify that the UE transmit timing offset stays within $N_{TA}\times T_S \pm 80\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

# A.7.1.18 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage

## A.7.1.18.1 Test Purpose and Environment

The purpose of this test is to verify that the Category NB1 UE under enhanced coverage is capable of following the frame timing change of the connected eNode B, that the UE initial transmit timing accuracy is within the specified limits and that the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission. This test will verify the requirements in clause 7.20.

For this test a single NB-IoT cell and a single LTE cell are used. Test parameters are given in Table A.7.1.18.1-1, Table A.7.1.18.1-2, Table A.7.1.18.1-3, and Table A.7.1.18.1-4. The transmit timing is verified by the UE transmitting NPUSCH.

**Table A.7.1.18.1-1: General Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| NB-IoT Operation mode | | In-band | In-band |
| DRX | | OFF | ON |
| NPRACH configuration | | NPRACH.R-1<br>As specified in A.3.18 | |
| NPDCCH repetition level | | 32 | 32 |
| npdcch-StartSF-USS Note 2 | | v2 | v2 |
| npdcch-NumRepetitions-r13 Note 2 | | r32 | r32 |
| NPUSCH resource units | | 1 | 1 |
| NPUSCH repetition level | | 128 | 128 |
| NPUSCH subcarrier spacing | kHz | 15 | 15 |
| NPUSCH number of subcarriers | | 1 | 1 |
| NPUSCH modulation | | π /4QPSK | π /4QPSK |
| NPUSCH Transport block size | Bits | 40 | 40 |
| Note 1: DRX related parameters are defined in Table A.7.1.18.1-4.<br>Note 2: For further information see clause 6.7.3.2 in TS 36.331 [2]. | | | |

**Table A.7.1.18.1-2: nCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| RF Channel Number | | 1 | 1 |
| $BW_{channel}$ | kHz | 200 | 200 |
| PRB location within eCell | | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 | eCell1 $BW_{channel}$ 5MHz: 17<br>eCell1 $BW_{channel}$ 10MHz: 30 |
| NPDSCH parameter | | eCell1 $BW_{channel}$ 5MHz: R.17 HD-FDD | eCell1 $BW_{channel}$ 5MHz: R.17 HD-FDD |

| | | | |
|---|---|---|---|
| | | eCell1 $BW_{channel}$ 10MHz: R.15 HD-FDD | eCell1 $BW_{channel}$ 10MHz: R.15 HD-FDD |
| NPDCCH parameter | | eCell1 $BW_{channel}$ 5MHz: R.41 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.29 HD-FDD | eCell1 $BW_{channel}$ 5MHz: R.41 HD-FDD<br>eCell1 $BW_{channel}$ 10MHz: R.29 HD-FDD |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>NOCNG_RA Note1<br>NOCNG_RB Note1 | dB | -3 | -3 |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.1.18.1-3 | Specified in Table A.7.1.18.1-3 |
| $\hat{E}_s / I_{ot}$ | dB | -11 | -11 |
| $\hat{E}_s / N_{oc}$ | dB | -11 | -11 |
| Antenna Configuration | | 2x1 | 2x1 |
| Propagation condition | - | AWGN | AWGN |
| Note 1 NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.7.1.18.1-3: eCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 |
| $BW_{channel}$ | MHz | 5 or 10 | 5 or 10 |
| NOCNG pattern | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | -3 | -3 |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -11 | -11 |
| Antenna Configuration | | 2x1 | 2x1 |
| Propagation condition | - | AWGN | AWGN |
| Note 1 OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.7.1.18.1-4: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 for E-UTRAN HD-FDD Category NB1 UE In-band mode under enhanced coverage**

| Field | Value | Comment |
|---|---|---|

| | Test 2 | |
|---|---|---|
| onDurationTimer | pp1 | |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | sf2048 | |
| shortDRX | disable | |
| Note 1: For further information see clause 6.7.3 in TS 36.331 [2]. | | |

### A.7.1.18.2 Test Requirements

For parameters specified in Tables A.7.1.18.1-1, Tables A.7.1.18.1-2, Tables A.7.1.18.1-3 and Tables A.7.1.18.1-4, the initial transmit timing accuracy shall be within the limits defined in clause 7.20.2 and the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 2048 ms (Tests 2):

a) After a connection is set up with the cell, the test system sends NPDCCH including uplink grant for NPUSCH transmission and the test system shall measure the UE transmit timing offset ($n \times Ts$) and verify that it is within $T_e$ ($n \times Ts \leq N_{TA} \times T_S \pm 80 \times T_S$) with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

b) The test system sends NPDCCH including uplink grant for NPUSCH transmission. After 16ms from the initial NPUSCH transmission, the test system adjusts the downlink transmit timing for the cell, using the value of n measured in a),

   - if $n < 0$, by $+(144 - |n|) \times T_S$ compared to that in (a).

   - if $n \geq 0$, by $-(144 - |n|) \times T_S$ compared to that in (a).

   The timing adjustment is performed monotonically in multiple steps of $|\Delta T| \leq 9 \times TS$ per 256 ms ($\Delta T$ is to be defined in the test procedure) until the above required total timing change is achieved, during which no grant is transmitted for the UE.

c) For test 2, the test system sends NPDCCH including uplink grant for NPUSCH transmission and shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 80 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1. The UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.19 E-UTRAN FDD - UE Transmit Timing Accuracy Test for RACH-less Handover

### A.7.1.19.1 Test Purpose and Environment

This test is to verify the requirement for the UE initial transmit timing after RACH-less handover specified in clause 7.1.

The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.7.1.19.1-1 and A.7.1.19.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

A RRC message implying RACH-less handover with *targetTa = ta0* shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

The transmit timing is verified by the PUSCH transmited by the UE

**Table A.7.1.19.1-1: General test parameters for E-UTRAN FDD - UE Transmit Timing Accuracy Test for RACH-less Handover**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 0 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Time offset between cells | | | 3 µs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.7.1.19.1-2: Cell specific test parameters for E-UTRAN FDD - UE Transmit Timing Accuracy Test for RACH-less Handover**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | - Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.7.1.19.2 Test Requirements

When first PUSCH is transmitted to cell2, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 2.

## A.7.1.20 E-UTRAN TDD - UE Transmit Timing Accuracy Test for RACH-less Handover

### A.7.1.20.1 Test Purpose and Environment

This test is to verify the requirement for the UE initial transmit timing after RACH-less handover specified in clause 7.1.

The test scenario comprises of 1 E-UTRA TDD carrier and 2 cells as given in tables A.7.1.20.1-1 and A.7.1.20.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

A RRC message implying RACH-less handover with *targetTa = ta0* shall be sent to the UE during period T2, after the UE has reported Event A3, and the PUSCH transmission in the cell2 is configured in the RRC message from cell1. T3 is defined as the end of the last TTI containing the RRC message implying handover.

The transmit timing is verified by the PUSCH transmited by the UE

**Table A.7.1.20.1-1: General test parameters for E-UTRAN TDD - UE Transmit Timing Accuracy Test for RACH-less Handover**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCHPHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell | | Cell 1 | |
| | Neighbouring cell | | Cell 2 | |
| Final condition | Active cell | | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| A3-Offset | | dB | 0 | |
| Hysteresis | | dB | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| ul-SchedInterval-r14 | | | sf10 | As specified in section 6.3.4 in TS 36.331 |
| ul-StartSubframe-r14 | | | 2 | As specified in section 6.3.4 in TS 36.331 |
| DRX | | | | OFF |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | ≤5 | |
| T3 | | s | 1 | |

**Table A.7.1.20.1-2: Cell specific test parameters for E-UTRAN TDD - UE Transmit Timing Accuracy Test for RACH-less Handover**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | - Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.7.1.20.2 Test Requirements

When first PUSCH is transmitted to cell2, the test system shall verify that the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 2.

## A.7.1.21 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeA

### A.7.1.21.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M2 UE in CEModeA is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

For this test a single cell is used. Table A.7.1.21.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.21.1-2.

**Table A.7.1.21.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M2 UE under CEModeA**

| Parameter | Unit | Value |
|---|---|---|

| | | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| DRX cycle | ms | N/A | 80[Note5] | 640[Note5] |
| PRACH Configuration | | PRACH_4CE As specified in A.3.16 | | |
| MPDCCH Reference measurement channel[Note1] | | R.16 FDD | R.16 FDD | R.16 FDD |
| OCNG Pattern[Note2] | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |
| OCNG_RA[Note3] | | | | |
| OCNG_RB[Note3] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.21.1-3.

**Table A.7.1.21.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M2 UE under CEModeA**

| Field | Value | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | 77 | 317 | SRS periodicity of 2ms, 80 ms and 320ms for Test 1, 2 and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

Note 1: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.21.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN FDD Cat-M2 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |

| | | | |
|---|---|---|---|
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.21.2 Test Requirements

For parameters specified in Tables A.7.1.21.1-1 and A.7.1.21.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.22 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeA

### A.7.1.22.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M2 UE in CEModeA is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

For this test a single cell is used. Table A.7.1.22.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.22.1-2.

**Table A.7.1.22.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M2 UE under CEModeA**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| DRX cycle | ms | N/A | 80[Note5] | 640[Note5] |
| PRACH configuration | | PRACH_4CE As specified in A.3.16 | | |
| MPDCCH Reference measurement channel[Note1] | | R.6 HD-FDD | R.6 HD-FDD | R. 6 HD-FDD |
| OCNG Pattern[Note2] | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |

| | | | | |
|---|---|---|---|---|
| MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA[Note3]<br>OCNG_RB[Note3] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s/I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s/N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.22.1-3.

**Table A.7.1.22.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M2 UE under CEModeA**

| Field | Value | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc1 | sc3 | sc3 | |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | N/A | N/A | N/A | Not applicable for FDD |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | 77 | 317 | SRS periodicity of 2ms, 80 ms and 320ms for Test 1, 2 and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

Note 1: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.1.22.1-3: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN HD-FDD Cat-M2 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |

Note 1: For further information see clause 6.3.2 in TS 36.331.

## A.7.1.22.2 Test Requirements

For parameters specified in Tables A.7.1.22.1-1 and A.7.1.22.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 12 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.1.23 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeA

## A.7.1.23.1 Test Purpose and Environment

The purpose of this test is to verify that the UE is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

For this test a single cell is used. Table A.7.1.23.1-1 defines the strength of the transmitted signals and the propagation condition. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.1.23.1-2.

**Table A.7.1.23.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M2 UE under CEModeA**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | 1 | 1 |
| DRX cycle | ms | N/A | 80[Note7] | 640[Note7] |
| PRACH configuration | | PRACH_4CE As specified in A.3.16 | | |
| MPDCCH Reference measurement channel[Note3] | | R.14 TDD | R.14 TDD | R.14 TDD |
| OCNG Pattern[Note4] | | OP.11 TDD | OP.11 TDD | OP.11 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | 0 | 0 | 0 |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| MPDCCH_RA | | | | |
| MPDCCH_RB | | | | |
| OCNG_RA[Note5] | | | | |
| OCNG_RB[Note5] | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | 3 | 3 |
| $\hat{E}_s / N_{oc}$ | dB | 3 | 3 | 3 |
| Io[Note6] | dBm/9 MHz | -65.5 | -65.5 | -65.5 |

| | | | | |
|---|---|---|---|---|
| | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 7: DRX related parameters are defined in Table A.7.1.23.1-3.

**Table A.7.1.23.1-2: Sounding Reference Symbol Configuration to be used in UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M2 UE under CEModeA**

| Field | Values | | | Comment |
|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | |
| srsBandwidthConfiguration | bw5 | bw5 | bw5 | |
| srsSubframeConfiguration | sc3 | sc3 | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | FALSE | FALSE | |
| srsMaxUpPTS | FALSE | FALSE | FALSE | |
| srsBandwidth | 0 | 0 | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | hbw0 | hbw0 | |
| frequencyDomainPosition | 0 | 0 | 0 | |
| Duration | TRUE | TRUE | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | 85 | 325 | SRS periodicity of 10, 80, and 320 ms for Test 1, 2, and 3, respectively. |
| transmissionComb | 0 | 0 | 0 | |
| cyclicShift | cs0 | cs0 | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | | | Number of antenna ports used for SRS transmission |

**Table A.7.1.23.1-3: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN TDD Cat-M2 UE under CEModeA**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf640 | |
| shortDRX | disable | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

## A.7.1.23.2 Test Requirements

For parameters specified in Tables A.7.1.23.1-1 and A.7.1.23.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64\times T_S$ (for Test 1 and Test 2) or $+32\times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for test 2 and test 3.

d) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + 624)\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.24 E-UTRAN FDD – UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeB

### A.7.1.24.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M2 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

As specified in Clause 7.26.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.24.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.24.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN FDD Cat-M2 UE under CEModeB**

| Parameter | | Unit | Value | | |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| DRX cycle | | ms | N/A | 80[Note5] | 640[Note5] |
| MPDCCH Reference measurement channel[Note1] | | | R.18 FDD | R.18 FDD | R.18 FDD |
| OCNG Pattern[Note2] | | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| Number of repetitions | MPDCCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA[Note3] | | | | | |
| OCNG_RB[Note3] | | | | | |
| $N_{oc}$ | | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 |
| Io[Note4] | | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.24.1-2.

**Table A.7.1.24.1-2: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN FDD Cat-M2 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.24.2 Test Requirements

For parameters specified in Tables A.7.1.24.1-1 and A.7.1.24.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.25 E-UTRAN HD-FDD – UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeB

### A.7.1.25.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M2 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

As specified in Clause 7.26.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.25.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.25.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN HD-FDD Cat-M2 UE under CEModeB**

| Parameter | Unit | Value | | |
|---|---|---|---|---|
| | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| DRX cycle | | ms | N/A | 80[Note5] | 640[Note5] |
| MPDCCH Reference measurement channel[Note1] | | | R.6 HD-FDD | R.6 HD-FDD | R. 6 HD-FDD |
| OCNG Pattern[Note2] | | | OP.21 FDD | OP.21 FDD | OP.21 FDD |
| Number of repetitions | MPDDCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA[Note3] | | | | | |
| OCNG_RB[Note3] | | | | | |
| $N_{oc}$ | | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 |
| Io[Note4] | | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.
Note 5: DRX related parameters are defined in Table A.7.1.25.1-2.

**Table A.7.1.25.1-2: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN HD-FDD Cat-M2 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf640 | |
| shortDRX | disable | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

## A.7.1.25.2 Test Requirements

For parameters specified in Tables A.7.1.25.1-1 and A.7.1.25.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.1.26 E-UTRAN TDD - UE Transmit Timing Accuracy Tests for Cat-M2 UE in CEModeB

## A.7.1.26.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M2 UE in CEModeB is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.26.2.

As specified in Clause 7.26.2 the UE adjusts its uplink timing at the end of of repetition period when configured with repetitions. By measuring the reception of the PUSCH, the transmit timing accuracy can be measured and the requirements can be verified. For this test a single cell is used. Table A.7.1.26.1-1 defines the strength of the transmitted signals and the propagation condition.

**Table A.7.1.26.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Cat-M2 UE under CEModeB**

| Parameter | | Unit | Value | | |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 |
| Special subframe configuration[Note1] | | | 6 | 6 | 6 |
| Uplink-downlink configuration[Note2] | | | 1 | 1 | 1 |
| DRX cycle | | ms | N/A | 80[Note7] | 640[Note7] |
| MPDCCH Reference measurement channel[Note3] | | | R.14 TDD | R.14 TDD | R.14 TDD |
| OCNG Pattern[Note4] | | | OP.11 TDD | OP.11 TDD | OP.11 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| Number of repetitions | MPDCCH | | 128 | | |
| | PUSCH | | 32 | | |
| PBCH_RB | | | 0 | 0 | 0 |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA[Note5] | | | | | |
| OCNG_RB[Note5] | | | | | |
| $N_{oc}$ | | dBm/15 kHz | -98 | -98 | -98 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 |
| Io[Note6] | | dBm/9 MHz | -86.4 | -86.4 | -86.4 |
| | | dBm/1.08 MHz | N/A | N/A | N/A |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.

| | |
|---|---|
| Note 5: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 6: | Io level has been derived from other parameters for information purpose. It is not a settable parameter. |
| Note 7: | DRX related parameters are defined in Table A.7.1.26.1-2. |

**Table A.7.1.26.1-2: DRX Configuration to be used in UE Transmit Timing Accuracy Test 2 and Test 3 for E-UTRAN TDD Cat-M2 UE under CEModeB**

| Field | Value | | Comment |
|---|---|---|---|
| | Test 2 | Test 3 | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf640 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.7.1.26.2 Test Requirements

For parameters specified in Tables A.7.1.26.1-1 and A.7.1.26.1-2, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.26.2. The UE shall not adjust the the transmission timing autonomously during an ongoing repetition period. Adjustments can only be done at the end of a last subframe in a repetition period.

The following sequence of events shall be used to verify that the requirements are met.

For the 10MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 80 ms or a cycle length of 640 ms (Tests 2 and 3, respectively):

a) After a connection is set up with the cell, the test system shall verify that the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+64 \times T_S$ (for Test 1 and Test 2) or $+32 \times T_S$ (for Test 3) compared to that in (a).

c) The test system shall verify that for Test 1 the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.26.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. Skip this step for Test 2 and Test 3.

d) The test system shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 40 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. For test 2 and test 3 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

## A.7.1.27 E-UTRAN TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-Band mode under normal coverage

### A.7.1.27.1 Test Purpose and Environment

The purpose of this test is to verify that the Category NB1 UE under normal coverage is capable of following the frame timing change of the connected eNode B and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.20.

For this test a single NB-IoT cell and a single LTE cell are used. Test parameters are given in Table A.7.1.27.1-1, Table A.7.1.27.1-2, and Table A.7.1.27.1-3. The transmit timing is verified by the UE transmitting NPUSCH.

**Table A.7.1.27.1-1: General Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| | | Test 1 | |

| | | | |
|---|---|---|---|
| NB-IoT Operation mode | | In-band | |
| DRX | | OFF | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.21 [16]1 |
| NPRACH configuration | | NPRACH.R-2 | As specified in A.3.18 |
| NPDCCH repetition level | | 1 | |
| npdcch-StartSF-USS Note 1 | | v8 | |
| npdcch-NumRepetitions-r13 Note 1 | | r1 | |
| NPUSCH repetition level | | 1 | |
| Note 1: For further information see clause 6.7.3.2 in TS 36.331 [2]. | | | |

**Table A.7.1.27.1-2: nCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| RF Channel Number | | 1 |
| $BW_{channel}$ | kHz | 200 |
| PRB location within eCell | | eCell $BW_{channel}$ 10MHz:30 |
| NPDSCH parameter | | eCell $BW_{channel}$ 10MHz: R.15 NB-TDD |
| NPDCCH parameter | | eCell $BW_{channel}$ 10MHz: R.29 NB-TDD |
| NPBCH_RA | dB | -3 |
| NPBCH_RB | | |
| NPSS_RA | | |
| NSSS_RA | | |
| NPDCCH_RA | | |
| NPDCCH_RB | | |
| NPDSCH_RA | | |
| NPDSCH_RB | | |
| NOCNG_RA Note1 | | |
| NOCNG_RB Note1 | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.1.27.1-3 |
| $\hat{E}_s / I_{ot}$ | dB | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Antenna Configuration | | 2x1 |
| Propagation condition | - | AWGN |
| Note 1 NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

**Table A.7.1.27.1-3: eCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| | | Test 1 |
| E-UTRA RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | | |
| PSS_RA | | |
| SSS_RA | | |
| PCFICH_RB | | |
| PHICH_RA | | |
| PHICH_RB | | |
| PDCCH_RA | | |
| PDCCH_RB | | |
| OCNG_RA Note1 | | |
| OCNG_RB Note1 | | |

| | | |
|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Antenna configuration | | 2x1 |
| Propagation condition | - | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

### A.7.1.27.2 Test Requirements

For parameters specified in Tables A.7.1.27.1-1, A.7.1.27.1-2, and A.7.1.27.1-3, the initial transmit timing accuracy, the maximum amount of timing change in one adjustment, the minimum and the maximum adjustment rate shall be within the limits defined in clause 7.20.2.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED:

a) After a connection is set up with the cell, the test system sends NPDCCH including uplink grant for NPUSCH transmission and the test system shall measure the UE transmit timing offset (n×Ts) and verify that it is within $T_e$ ($n \times Ts \leq N_{TA} \times T_S \pm 80 \times T_S$) with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

b) Using the value of n measured in a), the test system adjusts the downlink transmit timing for the cell:

- if $n < 0$, by $+(144 - |n|) \times T_S$ compared to that in (a).
- if $n \geq 0$, by $-(144 - |n|) \times T_S$ compared to that in (a).

The timing adjustment is performed monotonically in multiple steps of $|\Delta T| \leq 9 \times T_S$ per 256 ms ($\Delta T$ is to be defined in the test procedure) until the above required total timing change is achieved, during which no grant is transmitted for the UE.

c) Immediately after (b), the test system sends NPDCCH including uplink grant for NPUSCH transmission and immediately after receiving NPUSCH the test system repeatedly sends NPDCCH including uplink grant for NPUSCH transmission until the UE transmit timing offset is within $N_{TA} \times T_S \pm 80 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1. The test system shall verify that the difference in timing between the first NPUSCH transmission in step c) and the NPUSCH transmission in step a) shall be not greater than the maximum amount of the magnitude of the timing change in one adjustment requirement in clause 7.20.2. Using the first NPUSCH transmission in step c) and subsequent NPUSCH transmissions. The test system shall verify that the adjustment step size and the adjustment rate shall be according to the requirements in clause 7.20.2 until the UE transmit timing offset is within $N_{TA} \times T_S \pm 80 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

d) The test system the test system sends NPDCCH including uplink grant for NPUSCH transmission and shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 80 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

## A.7.1.28 E-UTRAN TDD – UE Transmit Timing Accuracy Tests for Category NB1 UE In-band mode under enhanced coverage

### A.7.1.28.1 Test Purpose and Environment

The purpose of this test is to verify that the Category NB1 UE under enhanced coverage is capable of following the frame timing change of the connected eNode B, that the UE initial transmit timing accuracy is within the specified limits and that the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission. This test will verify the requirements in clause 7.20.

For this test a single NB-IoT cell and a single LTE cell are used. Test parameters are given in Table A.7.1.28.1-1, Table A.7.1.28.1-2, Table A.7.1.28.1-3, and Table A.7.1.28.1-4. The transmit timing is verified by the UE transmitting NPUSCH.

**Table A.7.1.28.1-1: General Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| NB-IoT Operation mode | | In-band | In-band |
| DRX | | OFF | ON |
| Special subframe configuration | | 6 | |
| Uplink-downlink configuration | | 1 | |
| NPRACH configuration | | NPRACH.R-2 | |
| NPDCCH repetition level | | 32 | 32 |
| npdcch-StartSF-USS Note 2 | | v2 | v2 |
| npdcch-NumRepetitions-r13 Note 2 | | r32 | r32 |
| NPUSCH resource units | | 1 | 1 |
| NPUSCH repetition level | | 128 | 128 |
| NPUSCH subcarrier spacing | kHz | 15 | 15 |
| NPUSCH number of subcarriers | | 1 | 1 |
| NPUSCH modulation | | π /4QPSK | π /4QPSK |
| NPUSCH Transport block size | Bits | 40 | 40 |
| Note 1: DRX related parameters are defined in Table A.7.1.28.1-4.<br>Note 2: For further information see clause 6.7.3.2 in TS 36.331 [2]. | | | |

**Table A.7.1.28.1-2: nCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| RF Channel Number | | 1 | 1 |
| $BW_{channel}$ | kHz | 200 | 200 |
| PRB location within eCell | | eCell1 $BW_{channel}$ 10MHz: 30 | eCell1 $BW_{channel}$ 10MHz: 30 |
| NPDSCH parameter | | eCell1 $BW_{channel}$ 10MHz: R.15 NB-TDD | eCell1 $BW_{channel}$ 10MHz: R.15 NB-TDD |
| NPDCCH parameter | | eCell1 $BW_{channel}$ 10MHz:R.29 NB-TDD | eCell1 $BW_{channel}$ 10MHz: R.29 NB-TDD |
| NPBCH_RA | dB | -3 | -3 |
| NPBCH_RB | | | |
| NPSS_RA | | | |
| NSSS_RA | | | |
| NPDCCH_RA | | | |
| NPDCCH_RB | | | |
| NPDSCH_RA | | | |
| NPDSCH_RB | | | |
| NOCNG_RA Note1 | | | |
| NOCNG_RB Note1 | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.1.28.1-3 | Specified in Table A.7.1.28.1-3 |
| $\hat{E}_s / I_{ot}$ | dB | -11 | -11 |
| $\hat{E}_s / N_{oc}$ | dB | -11 | -11 |
| Antenna Configuration | | 2x1 | 2x1 |
| Propagation condition | - | AWGN | AWGN |
| Note 1: NOCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.7.1.28.1-3: eCell specific Test Parameters for UE Transmit Timing Accuracy Tests for E-UTRAN TDD Category NB1 UE in In-Band mode under enhanced coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | Test 1 | Test 2 |
| E-UTRA RF Channel Number | | 1 | 1 |

| $BW_{channel}$ | MHz | 10 | 10 |
|---|---|---|---|
| NOCNG pattern | | $BW_{channel}$ 10MHz: NOP.1 TDD | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 | -3 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| OCNG_RA Note1 | | | |
| OCNG_RB Note1 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -11 | -11 |
| Antenna Configuration | | 2x1 | 2x1 |
| Propagation condition | - | AWGN | AWGN |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |

**Table A.7.1.28.1-4: drx-Configuration to be used in UE Transmit Timing Accuracy Test 2 for E-UTRAN TDD Category NB1 UE In-band mode under enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| | Test 2 | |
| onDurationTimer | pp1 | |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | sf2048 | |
| shortDRX | disable | |
| Note 1: For further information see clause 6.7.3 in TS 36.331 [2]. | | |

## A.7.1.28.2 Test Requirements

For parameters specified in Tables A.7.1.28.1-1, Tables A.7.1.28.1-2, Tables A.7.1.28.1-3 and Tables A.7.1.28.1-4, the initial transmit timing accuracy shall be within the limits defined in clause 7.20.2 and the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission.

The following sequence of events shall be used to verify that the requirements are met.

The test sequence shall be carried out in RRC_CONNECTED for both non-DRX (for Test1) and DRX with a cycle length of 2048 ms (Tests 2):

a) After a connection is set up with the cell, the test system sends NPDCCH including uplink grant for NPUSCH transmission and the test system shall measure the UE transmit timing offset ($n \times Ts$) and verify that it is within $T_e$ ($n \times Ts \leq N_{TA} \times T_S \pm 80 \times T_S$) with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1.

b) The test system sends NPDCCH including uplink grant for NPUSCH transmission. After 16ms from the initial NPUSCH transmission, the test system adjusts the downlink transmit timing for the cell, using the value of n measured in a),

   - if $n < 0$, by $+(144 - |n|) \times T_S$ compared to that in (a).

   - if $n \geq 0$, by $-(144 - |n|) \times T_S$ compared to that in (a).

   The timing adjustment is performed monotonically in multiple steps of $|\Delta T| \leq 9 \times TS$ per 256 ms ($\Delta T$ is to be defined in the test procedure) until the above required total timing change is achieved, during which no grant is transmitted for the UE.

c) For test 2, the test system sends NPDCCH including uplink grant for NPUSCH transmission and shall verify that the UE transmit timing offset stays within $N_{TA} \times T_S \pm 80 \times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of NB-IoT cell 1. The UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

# A.7.2 UE Timing Advance

## A.7.2.1 E-UTRAN FDD – UE Timing Advance Adjustment Accuracy Test

### A.7.2.1.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.1.1-1, A.7.2.1.1-2, and A.7.2.1.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.1.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.1.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.1.1-1: General Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.1.1-2: Cell specific Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |

| | | | |
|---|---|---|---|
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s/I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | 3 | |
| Io[Note2] | dBm/9 MHz | -65.5 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

**Table A.7.2.1.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD Transmit Timing Accuracy Test**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 7 | SRS periodicity of 10. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.1.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.2 E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test

### A.7.2.2.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN TDD Timing Advance adjustment accuracy requirements, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.2.1-1, A.7.2.2.1-2, and A.7.2.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.2.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.1.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.2.1-1: General Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.2.1-2: Cell specific Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note2] | | 1 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | **0** | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note3] | dB | | |
| OCNG_RB[Note3] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |

| | | |
|---|---|---|
| $\hat{E}_s/I_{ot}$ | dB | 3 |
| $N_{oc}$ | dBm/15 KHz | -98 |
| $\hat{E}_s/N_{oc}$ | dB | **3** |
| Io[Note4] | dBm/9 MHz | -65.5 |
| Propagation Condition | | AWGN |
| Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.<br>Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.<br>Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | |

**Table A.7.2.2.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD Transmit Timing Accuracy Test**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | |
| srsBandwidth | bw0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | SRS periodicity of 10ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.2.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.3 E-UTRAN FDD – UE Timing Advance Adjustment Accuracy Test for 5MHz

### A.7.2.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.2.1.1.

The parameters of this test are the same as defined in Subclause A.7.2.1.1 except that the values of the parameters in the Table A.7.2.3.1-1 will replace the values of the corresponding parameters in A.7.2.1.1-1, table A.7.2.3.1-2 will replace the values of the corresponding parameters in A.7.2.1.1-2. Parameters used for the sounding reference symbol configuration are unchanged from table A.7.2.1.1-3.

**Table A.7.2.3.1-1: General Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Note 1: For the reference measurement channels, see clause A.3.1.<br>Note 2: See Table A.7.2.1.1-1 for the other parameters.<br>Note 3: This test is according to the principle defined in section A.3.7.2 | | | |

**Table A.7.2.3.1-2: Cell specific Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for 5MHz bandwidth**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) | | OP.15 FDD | |
| $Io^{Note2}$ | dBm/4.5 MHz | -68.5 | |
| Note 1: For the reference measurement channels, see clause A.3.2.<br>Note 2: See Table A.7.2.1.1-2 for the other parameters. | | | |

### A.7.2.3.2 Test Requirements

The test requirements defined in section A.7.2.1.2 shall apply to this test case.

## A.7.2.4 E-UTRAN FDD – UE Timing Advance Adjustment Accuracy Test for SCell in sTAG

### A.7.2.4.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.4.1-1, A.7.2.4.1-2, and A.7.2.4.1-3. For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell is in the primary Timing Advance Group (pTAG) and SCell is in the secondary Timing Advance Group (sTAG). The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.4.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for SCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.7.2.4.1-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.4.1-1: General Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for SCell in sTAG**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.4.1-2: Cell specific Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for SCell in sTAG**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Cell1 | | Cell2 | |
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Active PCell | | Cell1 | Cell1 | | |
| Active SCell | | | | Cell2 | Cell2 |
| TAG configuration | | pTAG | pTAG | sTAG | sTAG |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | | OP.1 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note1] | dB | | | | |
| OCNG_RB[Note1] | dB | | | | |
| Timing Advance Command ($T_A$) | | / | / | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | | 3 | |
| Io[Note2] | dBm/9 MHz | -65.5 | | -65.5 | |
| Propagation Condition | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

**Table A.7.2.4.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD Transmit Timing Accuracy Test for SCell in sTAG**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |

| | | |
|---|---|---|
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 7 | SRS periodicity of 10. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.4.2 Test Requirements

The UE shall apply the signalled Timing Advance value for SCell in sTAG to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy for SCell in STAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.5 E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test for Scell in sTAG

### A.7.2.5.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN TDD Timing Advance adjustment accuracy requirements, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.5.1-1, A.7.2.5.1-2, and A.7.2.5.1-3. For this test two cells are used. Cell 1 is PCell and Cell 2 is SCell. PCell is in the primary Timing Advance Group (pTAG) and SCell is in the secondary Timing Advance Group (sTAG). The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.5.1-3, are sent from the UE and received by the test equipment, but only for SCell. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for SCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.7.2.5.1-2. This value shall result in changes of the timing advance on SCell used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.5.1-1: General Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |

| | | | |
|---|---|---|---|
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.5.1-2: Cell specific Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Cell 1 | | Cell 2 | |
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Active PCell | | Cell1 | | | |
| Active SCell | | | | Cell2 | |
| TAG configuration | | pTAG | | sTAG | |
| Special subframe configuration[Note1] | | 6 | | 6 | |
| Uplink-downlink configuration[Note2] | | 1 | | 1 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | | OP.1 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note3] | dB | | | | |
| OCNG_RB[Note3] | dB | | | | |
| Timing Advance Command ($T_A$) | | | | 31 | 39 |
| $\hat{E}_s/I_{ot}$ | dB | 3 | | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | 3 | | 3 | |
| Io[Note4] | dBm/9 MHz | -65.5 | | -65.5 | |
| Propagation Condition | | AWGN | | AWGN | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

**Table A.7.2.5.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD Transmit Timing Accuracy Test for SCell in sTAG**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |

| | | |
|---|---|---|
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | |
| srsBandwidth | bw0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | SRS periodicity of 10ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.5.2 Test Requirements

The UE shall apply the signalled Timing Advance value for SCell in sTAG to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy for SCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.5A E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test for Scell in sTAG for 20 MHz +20 MHz

### A.7.2.5A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.2.5.1.

The parameters of this test are the same as defined in Subclause A.7.2.5.1 except that the values of the parameters in the Table A.7.2.5A.1-1 will replace the values of the corresponding parameters in A.7.2.5.1-1, table A.7.2.5A.1-2 will replace the values of the corresponding parameters in A.7.2.5.1-2. Parameters used for the sounding reference symbol configuration are unchanged from table A.7.2.5.1-3.

**Table A.7.2.5A.1-1: General Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG for 20 MHz +20 MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | As specified in clause A.3.1.2.2 |

**Table A.7.2.5A.1-2: Cell specific Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG for 20 MHz +20 MHz**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Cell 1 | | Cell 2 | |
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 20 | |
| OCNG Patterns defined in A.3.2.2 | | OP.7 TDD | | OP.7 TDD | |
| $Io^{Note4}$ | dBm/18 MHz | -62.5 | | -62.5 | |

### A.7.2.5A.2 Test Requirements

The test requirements defined in section A.7.2.5.2 shall apply to this test case.

# A.7.2.5B E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test for Scell in sTAG for 20 MHz +10 MHz

## A.7.2.5B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.2.5.1.

The parameters of this test are the same as defined in Subclause A.7.2.5.1 except that the values of the parameters in the Table A.7.2.5B.1-1 will replace the values of the corresponding parameters in A.7.2.5.1-1, table A.7.2.5B.1-2 will replace the values of the corresponding parameters in A.7.2.5.1-2. Parameters used for the sounding reference symbol configuration are unchanged from table A.7.2.5.1-3.

**Table A.7.2.5B.1-1: General Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG for 20 MHz +10 MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | For Cell 1: DL Reference Measurement Channel R.3 TDD<br>For Cell 2: DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | For Cell 1: DL Reference Measurement Channel R.10 TDD<br>For Cell 2: DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |

**Table A.7.2.5B.1-2: Cell specific Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for SCell in sTAG for 20 MHz +10 MHz**

| Parameter | Unit | Value | | | |
|---|---|---|---|---|---|
| | | Cell 1 | | Cell 2 | |
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 10 | |
| OCNG Patterns defined in A.3.2.2 | | OP.7 TDD | | OP.1 TDD | |
| $Io^{Note4}$ | dBm/18 MHz | -62.5 | | N/A | |
| | dBm/9 MHz | N/A | | -65.5 | |

## A.7.2.5B.2 Test Requirements

The test requirements defined in section A.7.2.5.2 shall apply to this test case.

# A.7.2.6 E-UTRAN FDD Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA

## A.7.2.6.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeA, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.6.1-1, A.7.2.6.1-2, and A.7.2.6.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.1.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.6.1-2. This value shall result in

changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.6.1-1: General Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | R.20 FDD | As specified in clause A.3.1.4.1 |
| MPDCCH parameters: DL Reference Measurement Channel | | R.16 FDD | As specified in clause A.3.1.3.1 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.6.1-2: Cell specific Test Parameters for E-UTRAN FDD UE Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.20 FDD | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.16 FDD | |
| OCNG Patterns defined in A.3.2.1.21 | | OP.21 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |

| | | |
|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| Io[Note2] | dBm/9 MHz | -65.5 |
| Propagation Condition | | AWGN |
| Note 1: OCNG shall be used such that cells is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | |

**Table A.7.2.6.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD UE Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | Bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 17 | SRS periodicity of 20. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.6.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.7 E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA

### A.7.2.7.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN HD-FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeA, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.7.1-1, A.7.2.7.1-2, and A.7.2.7.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.7.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.7.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.7.1-1: General Test Parameters for E-UTRAN HD-FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | R.10 HD-FDD | As specified in clause A.3.1.4.2 |
| MPDCCH parameters: DL Reference Measurement Channel | | R.6 HD-FDD | As specified in clause A.3.1.3.2 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.7.1-2: Cell specific Test Parameters for E-UTRAN HD-FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.10 HD-FDD | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.6 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.21 | | OP.21 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io[Note2] | dBm/9 MHz | -65.5 | |
| Propagation Condition | | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Io level has been derived from other parameters for information purpose. It is not a settable parameter. |

**Table A.7.2.7.1-3: Sounding Reference Symbol Configuration for E-UTRAN HD-FDD Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | Bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 17 | SRS periodicity of 20. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.7.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.8 E-UTRAN TDD Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA

### A.7.2.8.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN TDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeA, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.8.1-1, A.7.2.8.1-2, and A.7.2.8-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.8.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.8.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.8.1-1: General Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | R.16 TDD | As specified in clause A.3.1.4.3 |
| MPDCCH parameters: DL Reference Measurement Channel | | R.14 TDD | As specified in clause A.3.1.3.3 |
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.8.1-2: Cell specific Test Parameters for E-UTRAN TDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.16 TDD | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.14 TDD | |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note2] | | 1 | |
| OCNG Patterns defined in A.3.2.2.11 | | OP.11 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note3] | dB | | |
| OCNG_RB[Note3] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| Io[Note4] | dBm/9 MHz | -65.5 | |
| Propagation Condition | | AWGN | |

| | |
|---|---|
| Note 1: | For the special subframe configuration see table 4.2-1 in TS 36.211. |
| Note 2: | For the uplink-downlink configuration see table 4.2-2 in TS 36.211. |
| Note 3: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | Io level has been derived from other parameters for information purpose. It is not a settable parameter. |

**Table A.7.2.8.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | Bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | |
| srsBandwidth | bw0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | SRS periodicity of 10ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.8.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.9 HD-FDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhance Coverage

### A.7.2.9.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN Timing Advance adjustment accuracy requirements for UE category NB1 in enhanced coverage, defined in clause 7.22.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.9.1-1 and A.7.2.9.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and the UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 16.1.2 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.9.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the NPUSCH sent from the UE.

As specified in Clause 7.22.2.1, the UE adjusts its uplink timing at sub-frame $n$+12 for a timing advance command received in sub-frame $n$, where sub-frame $n$ refers to the last subframe in the repetition period in which the MAC control element containing timing advance command was received. In addition, the UE shall not apply a TA command during an uplink repetition period. The timing advance adjustment accuracy is verified via the uplink transmission of

NPUSCH carrying ACK/NACK response to the NPDSCH carrying TA command. $k_0$ in ACK/NACK resource filed in DCI is set as 13.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.9.1-1: General Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | Standalone | |
| CP Length | | | Normal | |
| Timing Advance Command ($T_A$) value during T1 | | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | | 39 | $N_{TA}$ = 128 |
| Number of repetitons | NPDCCH | | 128 | |
| | NPDSCH | | 128 | |
| | NPUSCH | | 32 | |
| DRX | | | OFF | |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.7.2.9.1-2: Cell specific Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | KHz | 200 | |
| NPDSCH parameters: DL Reference Measurement Channel defined in A.3.1.5.3 | | R.18 HD-FDD | |
| NPDCCH parameters: DL Reference Measurement Channel defined in A.3.1.6.3 | | R.30 HD-FDD | |
| NOCNG Patterns defined in A.3.2.3.3 | | NOP.3 FDD | |
| NPBCH_RA | dB | 0 | |
| NPBCH_RB | dB | | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA[Note1] | dB | | |
| NOCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | |
| $N_{oc}$ | dBm/15 KHz | -88 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| Io[Note2] | dBm/ 180 KHz | -76.9 | |
| Antenna Configuration | | 1x1 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

### A.7.2.9.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at subframe *n*+12, where subframe *n* is the last subframe in the repetition period of NPDSCH in which the timing advance command is received by the UE.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.22.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.10 E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

### A.7.2.10.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeB, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.10.1-1and A.7.2.10.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and PUSCH are sent from the UE and received by the test equipment. By measuring the reception of the PUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.10.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using PUSCH sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via PUSCH sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.10.1-1: General Test Parameters for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Number of repetitions of MPDCCH | | 128 | |
| Number of repetitions of PUSCH | | 32 | |

**Table A.7.2.10.1-2: Cell specific Test Parameters for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| PDSCH Reference Measurement Channel in clause A.3.1.4.4 | | R.22 FDD | |
| MPDCCH Reference Measurement Channel in clause A.3.1.3.4 | | R.18 FDD | |
| OCNG Patterns defined in A.3.2.1.21 | | OP.21 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note2 | dB | -12 | |
| RSRP Note2 | dBm/15 KHz | -110 | |
| Io Note2 | dBm/9 MHz | -69.95 | |
| Propagation Condition | | AWGN | |
| Antenna Configuration | | 1x1 | |
| Note 1: OCNG shall be used such that cells is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: $\hat{E}_s / I_{ot}$ , RSRP, Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

### A.7.2.10.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 subframes after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

When a repetition period is configured on the uplink, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period for which R>1.

## A.7.2.11 E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

### A.7.2.11.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN HD-FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeB, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.11.1-1and A.7.2.11.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and PUSCH are sent from the UE and received by the test equipment. By measuring the reception of the PUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.11.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using PUSCH sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via PUSCH sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.11.1-1: General Test Parameters for E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Number of repetitions of MPDCCH | | 128 | |
| Number of repetitions of PUSCH | | 32 | |

**Table A.7.2.11.1-2: Cell specific Test Parameters for E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH Reference Measurement Channel in clause A.3.1.4.5 | | R.12 HD-FDD | |
| MPDCCH Reference Measurement Channel in clause A.3.1.3.5 | | R.8 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.21 | | OP.21 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note2 | dB | -12 | |
| RSRP Note2 | dBm/15 KHz | -110 | |
| Io Note2 | dBm/9 MHz | -69.95 | |
| Propagation Condition | | AWGN | |
| Antenna Configuration | | 1x1 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | $\hat{E}_s / I_{ot}$ , RSRP, Io level has been derived from other parameters for information purpose. It is not a settable parameter. |

### A.7.2.11.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

When a repetition period is configured on the uplink, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period for which R>1.

## A.7.2.12 E-UTRAN TDD UE Timing Advance Adjustment Accuracy Test in CEModeB

### A.7.2.12.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN TDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeB, defined in clause 7.3.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.12.1-1and A.7.2.12.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and PUSCH are sent from the UE and received by the test equipment. By measuring the reception of the PUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.12.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using PUSCH sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at sub-frame n+6 for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via PUSCH sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.12.1-1: General Test Parameters for E-UTRAN TDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Timing Advance Command ($T_A$) value during T1 | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Number of repetitions of MPDCCH | | 128 | |
| Number of repetitions of PUSCH | | 32 | |

**Table A.7.2.12.1-2: Cell specific Test Parameters for E-UTRAN TDD UE Timing Advance Adjustment Accuracy Test in CEModeB**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH Reference Measurement Channel in clause A.3.1.4.6 | | R.18 TDD | |
| MPDCCH Reference Measurement Channel in clause A.3.1.3.6 | | R.16 TDD | |
| Special subframe configuration Note1 | | 6 | |
| Uplink-downlink configuration Note2 | | 1 | |
| OCNG Patterns defined in A.3.2.2.11 | | OP.11 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note3 | dB | | |
| OCNG_RB Note3 | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| $\hat{E}_s / I_{ot}$ Note4 | dB | -12 | |
| RSRP Note4 | dBm/15 KHz | -110 | |
| Io Note4 | dBm/9 MHz | -69.95 | |
| Propagation Condition | | AWGN | |
| Antenna Configuration | | 1x1 | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: $\hat{E}_s / I_{ot}$, RSRP, Io level has been derived from other parameters for information purpose. It is not a settable parameter.

## A.7.2.12.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

When a repetition period is configured on the uplink, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period for which R>1.

# A.7.2.13 E-UTRAN FDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE*

## A.7.2.13.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment delay requirements when *ShortTTI-r15* is configured or *ShortProcessingTime=TRUE*, defined in clause 7.3.2.2, in an AWGN model.

The test consists of 4 tests.The test parameters are given in tables A.7.2.13.1-1, A.7.2.13.1-2, and A.7.2.13.1-3. In each test, timing advance command is sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.13.1-3, is sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment delay can be measured.The test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.13.1-2.

In test 1, when *ShortTTI*-r15 is not configured and *ShortProcessingTime=TRUE* , the UE adjusts its uplink timing at sub-frame n+5 for a timing advance command received in sub-frame n. In test 2, when *dl-STTI-Length-r15*=slot, the UE adjusts its uplink timing at the first subframe boundary following *n+8* slot for a timing advance command received in slot n. In test 3, when *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus4set1, the UE adjusts its uplink timing at the first subframe boundary following *n+16* subslot for a timing advance command received in subslot *n*. In test 4, when *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*= nplus6set1 or

*proc-Timeline-r15*= nplus6set2, the UE adjusts its uplink timing at the first subframe boundary following n+18 subslot for a timing advance command received in subslot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.13.1-1: General Test Parameters for E-UTRAN FDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel for FDD with slot duration TTI: R.8 FDD;<br>DL Reference Measurement Channel for FDD with subslot duration TTI: R.9 FDD; | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Timing Advance Command ($T_A$) value | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.13.1-2: Cell specific Test Parameters E-UTRAN FDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE* (test1, test 2, test 3 and test 4)**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |

| | | | |
|---|---|---|---|
| PDCCH_RA | dB | 0 | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s/I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | 3 | |
| Io[Note2] | dBm/9 MHz | -65.5 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

**Table A.7.2.13.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE***

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 7 | SRS periodicity of 10. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

## A.7.2.13.2 Test Requirements

In test 1, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 5 sub frames after the reception of the timing advance command in sub-frame n.

In test 2, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. at the first subframe boundary following *8* slots after the reception of the timing advance command in slot *n*.

In test 3, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. at the first subframe boundary following 16 subslots after the reception of the timing advance command in subslot *n*.

In test 4, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. at the first subframe boundary following 18 subslots after the reception of the timing advance command in subslot *n*.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

# A.7.2.14 E-UTRAN TDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE*

## A.7.2.14.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN TDD Timing Advance adjustment delay requirements when *ShortTTI-r15* is configured or *ShortProcessingTime=TRUE*, defined in clause 7.3.2.2, in an AWGN model.

The test consists of 2 tests.The test parameters are given in tables A.7.2.14.1-1, A.7.2.14.1-2, and A.7.2.14.1-3. In each test, timing advance command is sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.2.14.1-3, is sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment delay can be measured.The test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.14.1-2.

In test 1, when *ShortTTI*-r15 is not configured and *ShortProcessingTime=TRUE* , the UE adjusts its uplink timing at sub-frame n+5 for a timing advance command received in sub-frame n. In test 2, when *dl-STTI-Length-r15*=slot, the UE adjusts its uplink timing at the first subframe boundary following *n+8* slot for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.14.1-1: General Test Parameters for E-UTRAN TDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel for TDD slot duration TTI: R6 TDD; | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.1 |
| Timing Advance Command ($T_A$) value | | 39 | $N_{TA}$ = 128 |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.7.2.14.1-2: Cell specific Test Parameters E-UTRAN TDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE* (test1 and test 2)**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration[Note1] | | 6 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |

| | | | |
|---|---|---|---|
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s/I_{ot}$ | dB | 3 | |
| $N_{oc}$ | dBm/15 KHz | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | 3 | |
| Io[Note2] | dBm/9 MHz | -65.5 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter.<br>Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

**Table A.7.2.14.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD – UE Timing Advance Adjustment delay Test for sTTI and *ShortProcessingTime=TRUE***

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN TDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 7 | SRS periodicity of 10. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.2.14.2 Test Requirements

In test 1, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 5 sub frames after the reception of the timing advance command in sub-frame n.

In test 2, the UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. at the first subframe boundary following *8* slots after the reception of the timing advance command in slot *n*.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.2.15 E-UTRAN TDD – TDD UE Timing Advance Adjustment Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage

### A.7.2.15.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN Timing Advance adjustment accuracy requirements for UE category NB1 in enhanced coverage, defined in clause 7.22.2.2, in an AWGN model.

The test parameters are given in tables A.7.2.15.1-1 and A.7.2.15.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and the UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring

the reception of the NPUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321 [17]. The Timing Advance Command value shall be set to 31, which according to Clause 16.1.2 in TS 36.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.2.15.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the NPUSCH sent from the UE.

As specified in Clause 7.22.2.1, the UE adjusts its uplink timing at sub-frame $n$+12 for a timing advance command received in sub-frame $n$, where sub-frame $n$ refers to the last subframe in the repetition period in which the MAC control element containing timing advance command was received. In addition, the UE shall not apply a TA command during an uplink repetition period. The timing advance adjustment accuracy is verified via the uplink transmission of NPUSCH carrying ACK/NACK response to the NPDSCH carrying TA command. $k_0$ in ACK/NACK resource filed in DCI is set as 13 or larger to to refer to the first UL subframe after $n+12$.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321 [17], shall be configured so that it does not expire in the duration of the test.

**Table A.7.2.15.1-1: General Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | Standalone | |
| CP Length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| Timing Advance Command ($T_A$) value during T1 | | | 31 | $N_{TA}$ = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command ($T_A$) value during T2 | | | 39 | $N_{TA}$ = 128 |
| Number of repetitons | NPDCCH | | 128 | |
| | NPDSCH | | 128 | |
| | NPUSCH | | 32 | |
| DRX | | | OFF | |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.7.2.15.1-2: Cell specific Test Parameters for E-UTRAN Timing Advance Accuracy Test for UE Category NB1 in Standalone Mode under Enhanced Coverage**

| Parameter | Unit | Value | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | KHz | 200 | |
| NPDSCH parameters: DL Reference Measurement Channel defined in A.3.1.5.3 | | R.18 NB-TDD | |
| NPDCCH parameters: DL Reference Measurement Channel defined in A.3.1.6.3 | | R.30 NB-TDD | |
| NOCNG Patterns defined in A.3.2.3.3 | | NOP.3 TDD | |
| NPBCH_RA | dB | | |
| NPBCH_RB | dB | | |

| | | | |
|---|---|---|---|
| NPSS_RA | dB | 0 | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| NOCNG_RA[Note1] | dB | | |
| NOCNG_RB[Note1] | dB | | |
| Timing Advance Command ($T_A$) | | 31 | 39 |
| $\hat{E}_s / I_{ot}$ | dB | -12 | |
| $N_{oc}$ | dBm/15 KHz | -88 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | |
| Io[Note2] | dBm/ 180 KHz | -76.9 | |
| Antenna Configuration | | 1x1 | |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

### A.7.2.15.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at subframe *n*+12, where subframe *n* is the last subframe in the repetition period of NPDSCH in which the timing advance command is received by the UE.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.22.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

## A.7.3 Radio Link Monitoring

In the following section, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 36.101 [5]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 36.101 [5]) means no uplink signal.

### A.7.3.1 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync

#### A.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.1.1-1, A.7.3.1.1-2 and A.7.3.1.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

**Table A.7.3.1.1-1: General test parameters for E-UTRAN FDD out-of-sync testing**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | Test 1 | Test 2 | Test 3 | Test 4 | |
|---|---|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.6 FDD | R.7 FDD | R.6 FDD | R.7 FDD | As specified in section A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD | As specified in section A.3.2.1.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 2x2 | 1x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | 2 | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | 0 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | 1 | 4 | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | 1 | 4 | 1 | |
| DRX | | | OFF | OFF | OFF | OFF | |
| Layer 3 filtering | | | *Enabled* | *Enabled* | *Enabled* | *Enabled* | *Counters: N310 = 1; N311 = 1* |
| T310 timer | | *ms* | *0* | *0* | *0* | *0* | *T310 is disabled* |
| T311 timer | | ms | 1000 | 1000 | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | 2 | 2 | 2 | Minimum CQI reporting periodicity |
| Propagation channel | | | AWGN | AWGN | ETU 70 Hz | ETU 70 Hz | . |
| T1 | | s | 1 | 1 | 1 | 1 | |
| T2 | | s | 0.4 | 0.4 | 0.4 | 0.4 | |
| T3 | | s | 0.5 | 0.5 | 0.5 | 0.5 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | | | |

**Table A.7.3.1.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for out-of-sync radio link monitoring tests # 1 and # 2**

| Parameter | Unit | Test 1 | | | Test 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Antenna Configuration | | 1x2 | | | 2x2 | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | 0 | | | -3 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PCFICH_RB | dB | 4 | | | 1 | | |
| PDCCH_RA | dB | 4 | | | 1 | | |
| PDCCH_RB | dB | 4 | | | 1 | | |
| PBCH_RA | dB | 0 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| SNR Note 6,7 | dB | -4.7 | -9.5 | -13.5 | -4.7 | -9.5 | -13.5 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.1.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.1.1-3: Cell specific test parameters for E-UTRAN FDD (cell # 1) for out-of-sync radio link monitoring tests # 3 and # 4**

| Parameter | Unit | Test 3 | | | Test 4 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 2x2 Low | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | 0 | | | -3 | | |
| PCFICH_RB | dB | 4 | | | 1 | | |
| PDCCH_RA | dB | 4 | | | 1 | | |
| PDCCH_RB | dB | 4 | | | 1 | | |
| PBCH_RA | dB | 0 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| SNR Note 6,7 | dB | -1.4 | -5.5 | -11.5 | -2.3 | -6.2 | -12.2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.1.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

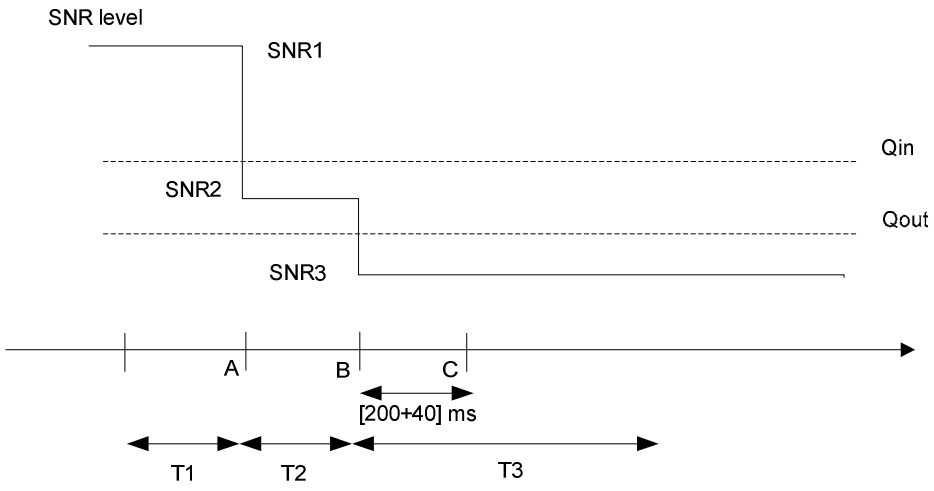

**Figure A.7.3.1.1-1 SNR variation for out-of-sync testing**

### A.7.3.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.2 E-UTRAN FDD Radio Link Monitoring Test for In-sync

### A.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.2.1-1 and A.7.3.2.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

**Table A.7.3.2.1-1: General test parameters for E-UTRAN FDD in-sync testing**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | | R.6 FDD | R.7 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 FDD | OP.2 FDD | As specified in clause A.3.2.1.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 1x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters (Note 1) | DCI format | | 1C | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 |
| | Aggregation level | CCE | 4 | 4 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | |

| | | | | | |
|---|---|---|---|---|---|
| | Ratio of PDCCH to RS EPRE | | 0 | -3 | respectively. |
| | Ratio of PCFICH to RS EPRE | | 4 | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | 1 | |
| DRX | | | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | 2 | Minimum CQI reporting periodicity |
| Propagation channel | | | ETU 70 Hz | ETU 70 Hz | |
| T1 | | s | 0.5 | 0.5 | |
| T2 | | s | 0.4 | 0.4 | |
| T3 | | s | 1.46 | 1.46 | |
| T4 | | s | 0.4 | 0.4 | |
| T5 | | s | 1 | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

**Table A.7.3.2.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for in-sync radio link monitoring tests # 1 and # 2**

| Parameter | Unit | Test 1 | | | | | Test 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | | | 2x2 Low | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | **OP.2 FDD** | | | | | **OP.2 FDD** | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\rho_A$, $\rho_B$ | | 0 | | | | | -3 | | | | |
| PCFICH_RB | dB | 4 | | | | | 1 | | | | |
| PDCCH_RA | dB | 0 | | | | | -3 | | | | |
| PDCCH_RB | dB | 0 | | | | | -3 | | | | |
| PBCH_RA | dB | **0** | | | | | **-3** | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| SNR Note 6,7 | dB | -1.4 | -5.5 | -11.5 | -6.4 | -1.4 | -2.3 | -6.2 | -12.2 | -7.3 | -2.3 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | | | | |
| Propagation condition | | ETU 70 Hz | | | | | ETU 70 Hz | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.2.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

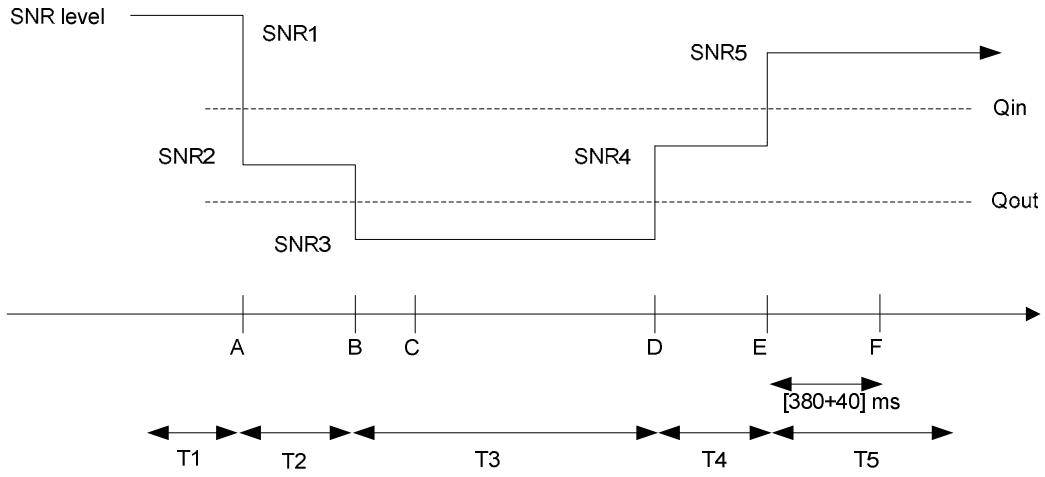


**Figure A.7.3.2.1-1 SNR variation for in-sync testing**

## A.7.3.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.3 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync

## A.7.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.3.1-1, A.7.3.3.1-2 and A.7.3.3.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

**Table A.7.3.3.1-1: General test parameters for E-UTRAN TDD out-of-sync testing**

| Parameter | | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | Test 4 | |
| PCFICH/PDCCH/PHICH parameters | | | R.6 TDD | R.7 TDD | R.6 TDD | R.7 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 2x2 | 1x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | 2 | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | 0 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | 1 | 4 | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | 1 | 4 | 1 | |
| DRX | | | OFF | OFF | OFF | OFF | |
| Layer 3 filtering | | | *Enabled* | *Enabled* | *Enabled* | *Enabled* | *Counters: N310 = 1; N311 = 1* |
| T310 timer | | *ms* | *0* | *0* | *0* | *0* | *T310 is disabled* |
| T311 timer | | ms | 1000 | 1000 | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | 1 | 1 | 1 | Minimum CQI reporting periodicity |
| Propagation channel | | | AWGN | AWGN | ETU 70 Hz | ETU 70 Hz | . |
| T1 | | s | 1 | 1 | 1 | 1 | |
| T2 | | s | 0.4 | 0.4 | 0.4 | 0.4 | |
| T3 | | s | 0.5 | 0.5 | 0.5 | 0.5 | |

Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.

**Table A.7.3.3.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests # 1 and # 2**

| Parameter | Unit | Test 1 | | | Test 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Antenna Configuration | | 1x2 | | | 2x2 | | |
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| $\rho_A$, $\rho_B$ | | 0 | | | -3 | | |
| PCFICH_RB | dB | 4 | | | 1 | | |
| PDCCH_RA | dB | 4 | | | 1 | | |
| PDCCH_RB | dB | 4 | | | 1 | | |
| PBCH_RA | dB | 0 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 3] | dB | | | | | | |
| OCNG_RB[Note 3] | dB | | | | | | |
| SNR [Note 8,9] | dB | -5.1 | -9.1 | -13.1 | -5.2 | -9.2 | -13.2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | AWGN | | | AWGN | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.3.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.3.1-3: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests # 3 and # 4**

| Parameter | Unit | Test 3 | | | Test 4 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |

| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 2x2 Low | | |
|---|---|---|---|---|---|---|---|
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | **OP.2 TDD** | | | **OP.2 TDD** | | |
| $\rho_A$, $\rho_B$ | | 0 | | | -3 | | |
| PCFICH_RB | dB | 4 | | | 1 | | |
| PDCCH_RA | dB | 4 | | | 1 | | |
| PDCCH_RB | dB | 4 | | | 1 | | |
| PBCH_RA | dB | **0** | | | **-3** | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 3] | dB | | | | | | |
| OCNG_RB[Note 3] | dB | | | | | | |
| SNR [Note 8] | dB | -1.4 | -5.3 | -11.3 | -2.3 | -5.9 | -11.9 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.3.1-1.

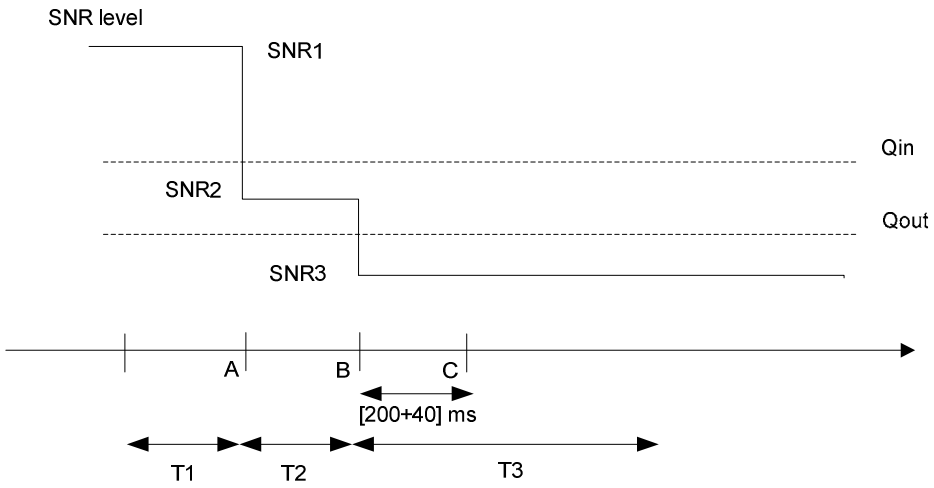


**Figure A.7.3.3.1-1. SNR variation for out-of-sync testing**

### A.7.3.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.4 E-UTRAN TDD Radio Link Monitoring Test for In-sync

### A.7.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.4.1-1 and A.7.3.4.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

**Table A.7.3.4.1-1: General test parameters for E-UTRAN TDD in-sync testing**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | | R.6 TDD | R.7 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 1x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters (Note 1) | DCI format | | 1C | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | 4 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | |
| | Ratio of PDCCH to RS EPRE | | 0 | -3 | |

| | | | | | |
|---|---|---|---|---|---|
| | Ratio of PCFICH to RS EPRE | | 4 | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | 1 | |
| DRX | | | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | 1 | Minimum CQI reporting periodicity |
| Propagation channel | | | ETU 70 Hz | ETU 70 Hz | |
| T1 | | s | 0.5 | 0.5 | |
| T2 | | s | 0.4 | 0.4 | |
| T3 | | s | 1.46 | 1.46 | |
| T4 | | s | 0.4 | 0.4 | |
| T5 | | s | 1 | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

**Table A.7.3.4.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring tests # 1 and # 2**

| Parameter | Unit | Test 1 | | | | | Test 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | | | 2x2 Low | | | | |
| Special subframe configuration[Note1] | | 6 | | | | | 6 | | | | |
| Uplink-downlink configuration[Note2] | | 1 | | | | | 1 | | | | |

| OCNG Pattern defined in A.3.2.2 (TDD) | | **OP.2 TDD** | | | | | **OP.2 TDD** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\rho_A$, $\rho_B$ | | 0 | | | | | -3 | | | | |
| PCFICH_RB | dB | 4 | | | | | 1 | | | | |
| PDCCH_RA | dB | 0 | | | | | -3 | | | | |
| PDCCH_RB | dB | 0 | | | | | -3 | | | | |
| PBCH_RA | dB | **0** | | | | | **-3** | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 3 | dB | | | | | | | | | | |
| OCNG_RB Note 3 | dB | | | | | | | | | | |
| SNR Note 8,9 | dB | -1.4 | -5.3 | -11.3 | -6.4 | -1.4 | -2.3 | -5.9 | -11.9 | -7.3 | -2.3 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | | | | |
| Propagation condition | | ETU 70 Hz | | | | | ETU 70 Hz | | | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.4.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

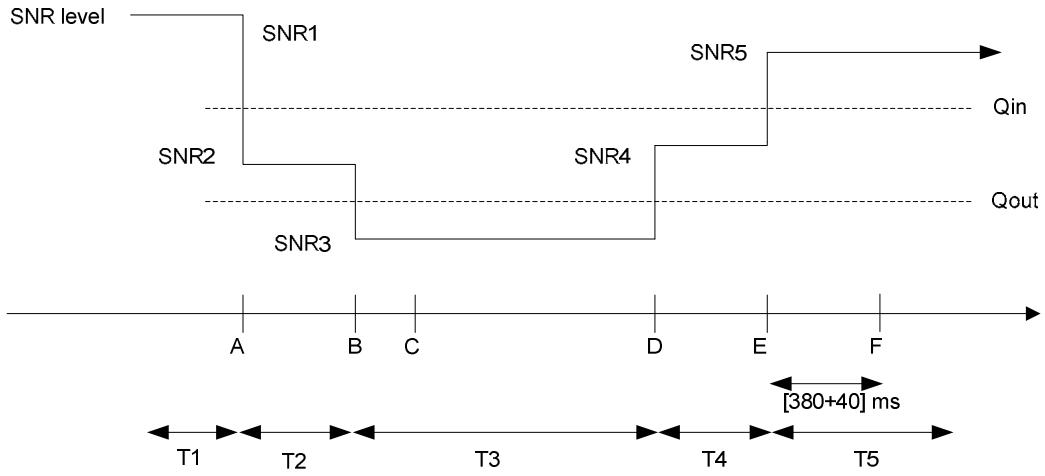


**Figure A.7.3.4.1-1. SNR variation for in-sync testing**

## A.7.3.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink subframes configured for CQI transmission according to the configured CQI mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.5 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync in DRX

### A.7.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.5.1-1, A.7.3.5.1-2, A.7.3.5.1-3 and A.7.3.5.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.5.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.5.1-1: General test parameters for E-UTRAN FDD out-of-sync tests in DRX**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | | R.7 FDD | R.6 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 FDD | OP.2 FDD | As specified in clause A.3.2.1.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | 1x2 | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | |
| | ρA, ρB | | -3 | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | 4 | |
| DRX cycle | | ms | 40 | 1280 | See Table A.7.3.5.1-3 |
| Layer 3 filtering | | | Enabled | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | 2 | Minimum CQI reporting periodicity |
| Propagation channel | | | ETU 70 Hz | AWGN | . |
| T1 | | s | 4 | 32 | |
| T2 | | s | 1.6 | 12.8 | |
| T3 | | s | 1.8 | 13 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

**Table A.7.3.5.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for out-of-sync radio link monitoring tests # 1 and # 2 in DRX**

| Parameter | Unit | Test 1 | | | Test 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 1x2 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | 0 | | |
| PCFICH_RB | dB | 1 | | | 4 | | |
| PDCCH_RA | dB | 1 | | | 4 | | |
| PDCCH_RB | dB | 1 | | | 4 | | |
| PBCH_RA | dB | -3 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note1] | dB | | | | | | |
| OCNG_RB[Note1] | dB | | | | | | |
| SNR [Note 6,7] | dB | -2.3 | -6.2 | -12.2 | -4.7 | -9.5 | -13.5 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | AWGN | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.5.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.5.1-3: DRX-Configuration for E-UTRAN FDD out-of-sync tests**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.7.3.5.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD out-of-sync testing**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | infinity | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

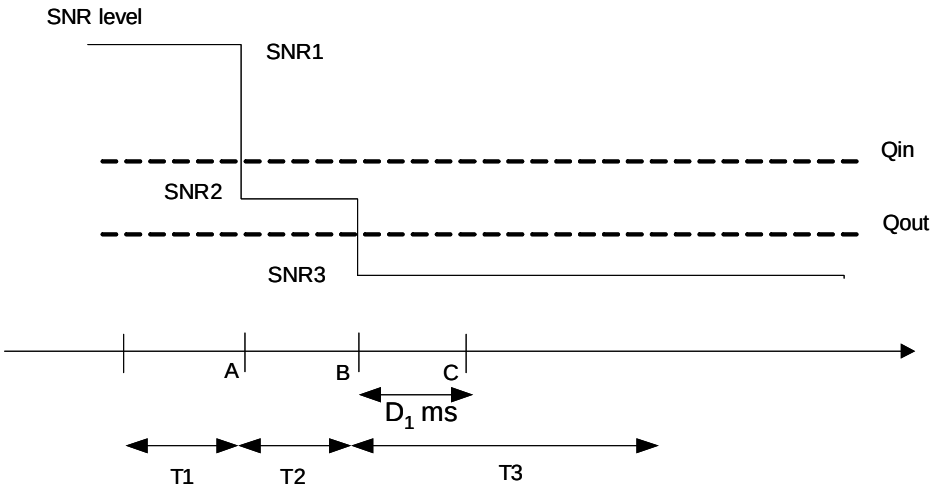


**Figure A.7.3.5.1-1 SNR variation for out-of-sync testing in DRX**

## A.7.3.5.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

In test 1 and test 2 during the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

In test 1 the UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 900 ms after the start of time duration T3).

In test 2 the UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.6 E-UTRAN FDD Radio Link Monitoring Test for In-sync in DRX

## A.7.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.6.1-1, A.7.3.6.1-2, A.7.3.6.1-3 and A.7.3.6.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.6.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.6.1-1: General test parameters for E-UTRAN FDD in-sync test in DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.6 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 FDD | As specified in clause A.3.2.1.2. |
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Antenna Configuration | | | 1x2 | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle | | ms | 40 | See Table A.7.3.6.1-3 |
| Layer 3 filtering | | | *Enabled* | *Counters: N310 = 1; N311 = 1* |
| T310 timer | | *ms* | *2000* | *T310 is enabled* |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |

| | | | |
|---|---|---|---|
| CQI reporting periodicity | ms | 2 | Minimum CQI reporting periodicity |
| Propagation channel | | AWGN | |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.6.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for in-sync radio link monitoring test # 1 in DRX**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Antenna Configuration | | 1x2 | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | | |
| $\rho_A$, $\rho_B$ | | 0 | | | | |
| PCFICH_RB | dB | 4 | | | | |
| PDCCH_RA | dB | 0 | | | | |
| PDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| SNR Note 6,7 | dB | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| Propagation condition | | AWGN | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.6.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

**Table A.7.3.6.1-3: DRX-Configuration for E-UTRAN FDD out-of-sync tests**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.6.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD out-of-sync testing**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

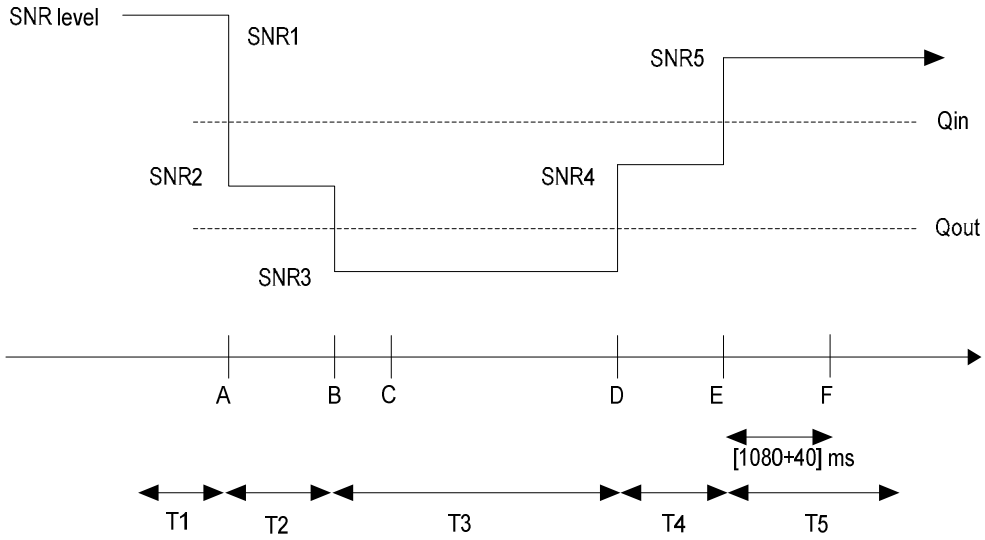


**Figure A.7.3.6.1-1 SNR variation for in-sync testing in DRX**

### A.7.3.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.7 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX

### A.7.3.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.7.1-1, A.7.3.7.1-2, A.7.3.7.1-3 and A.7.3.7.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.7.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.7.1-1: General test parameters for E-UTRAN TDD out-of-sync tests in DRX**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.7 TDD | R.6 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Active cell | | | Cell 1 | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | 1x2 | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | |
| | ρA, ρB | | -3 | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | 4 | |
| DRX cycle | | ms | 40 | 1280 | See Table A.7.3.7.1-3 |
| Layer 3 filtering | | | Enabled | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | 1 | Minimum CQI reporting periodicity |
| Propagation channel | | | ETU 70 Hz | AWGN | . |
| T1 | | s | 4 | 32 | |
| T2 | | s | 1.6 | 12.8 | |
| T3 | | s | 1.8 | 13 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

**Table A.7.3.7.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests # 1 and # 2 in DRX**

| Parameter | Unit | Test 1 | | | Test 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 1x2 | | |
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | 0 | | |
| PCFICH_RB | dB | 1 | | | 4 | | |
| PDCCH_RA | dB | 1 | | | 4 | | |
| PDCCH_RB | dB | 1 | | | 4 | | |
| PBCH_RA | dB | -3 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note3] | dB | | | | | | |
| OCNG_RB[Note3] | dB | | | | | | |
| SNR [Note 8,9] | dB | -2.3 | -5.9 | -11.9 | -5.1 | -9.1 | -13.1 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | AWGN | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.7.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.7.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.7.3.7.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | infinity | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

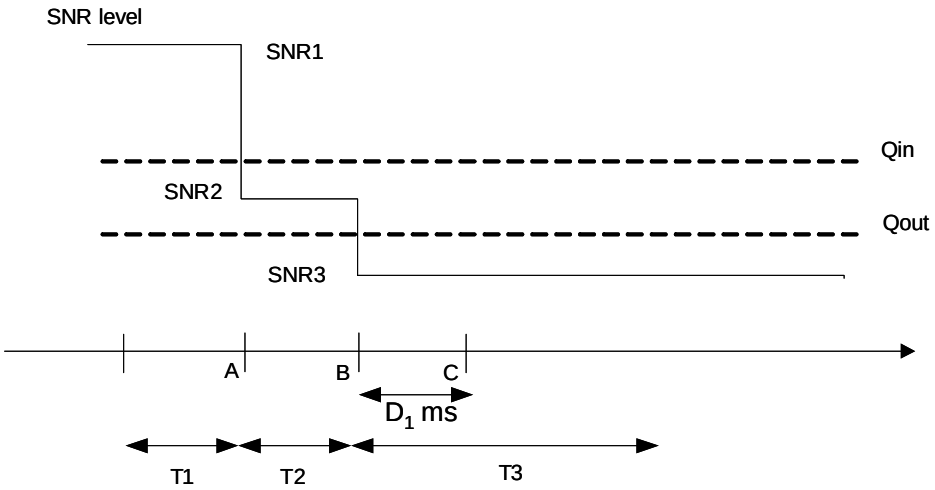


**Figure A.7.3.7.1-1 SNR variation for out-of-sync testing in DRX**

### A.7.3.7.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

In test 1 and test 2 during the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe according to the configured CQI reporting mode (PUCCH 1-0).

In test 1 the UE shall stop transmitting uplink signal no later than time point C ($D_1$ = 900 ms after the start of time duration T3).

In test 2 the UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.8 E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX

### A.7.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.8.1-1, A.7.3.8.1-2, A.7.3.8.1-3 and A.7.3.8.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.8.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.8.1-1: General test parameters for E-UTRAN TDD in-sync test in DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.6 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | Normal | |

| | | | | |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Antenna Configuration | | | 1x2 | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle | | ms | 40 | See Table A.7.3.8.1-3 |
| Layer 3 filtering | | | *Enabled* | *Counters: N310 = 1; N311 = 1* |
| T310 timer | | *ms* | *2000* | *T310 is enabled* |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| Propagation channel | | | AWGN | |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.8.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring test # 1 in DRX**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Antenna Configuration | | 1x2 | | | | |
| Special subframe configuration[Note1] | | 6 | | | | |
| Uplink-downlink configuration[Note2] | | 1 | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | |
| $\rho_A$, $\rho_B$ | | 0 | | | | |
| PCFICH_RB | dB | 4 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| PDCCH_RA | dB | 0 | | | | |
| PDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | 0 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note3] | dB | | | | | |
| OCNG_RB[Note3] | dB | | | | | |
| SNR [Note 8,9] | dB | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| Propagation condition | | AWGN | | | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.8.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

**Table A.7.3.8.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.8.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

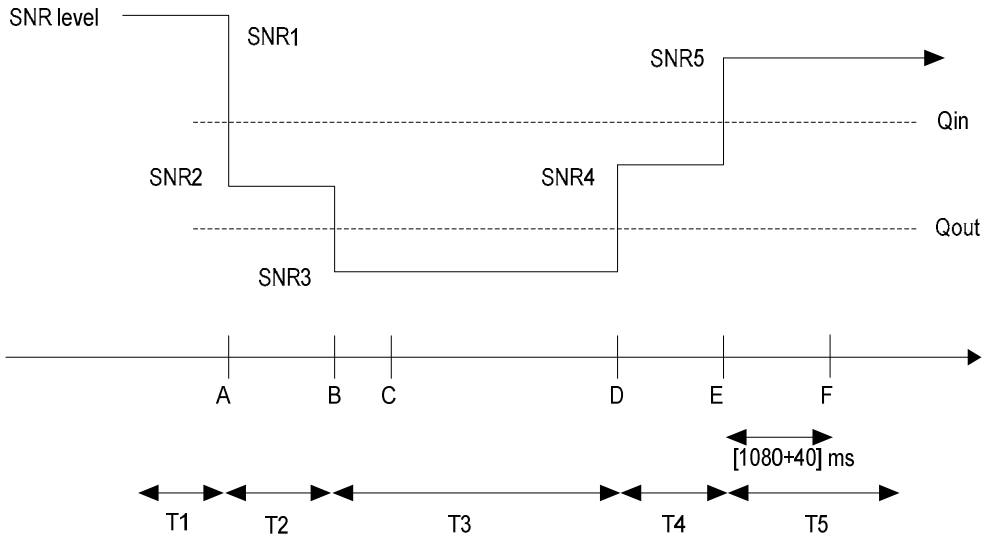


**Figure A.7.3.8.1-1 SNR variation for in-sync testing in DRX**

### A.7.3.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.9 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction and Non-MBSFN ABS

### A.7.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.9.1-1 and A.7.3.9.1-2 below. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.9.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in the aggressor Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.9.1-1: General test parameters for E-UTRAN FDD out-of-sync testing under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.9.FDD | As specified in clause A.3.1.2.1.<br>None of the PDCCH are intended for the UE under test |
| OCNG parameters | | OP.6 FDD | As specified in clause A.3.2.1.6. |
| Serving cell (PCell) | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |

| | | | | |
|---|---|---|---|---|
| Neighbor cell | | | Cell 2 | Aggressor cell on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Physical cell ID PCI | | | ($PCI_{cell1}$-$PCI_{cell2}$ )mod3 != 0 | Cell IDs are chosen such that CRS from cells 1 and 2 do not overlap in frequency |
| ABS pattern | | | '10000000100000001000000010000000010000000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2. The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | | '10000000100000001000000010000000010000000' | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel | | | | |

**Table A.7.3.9.1-2: Cell specific test parameters for E-UTRAN FDD for out-of-sync radio link monitoring under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |

| | | | | | |
|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.1.6 (FDD) | | OP.6 FDD | | | OP.6 FDD |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. |
| PDCCH_RA | dB | 1 | | | |
| PDCCH_RB | dB | 1 | | | |
| PBCH_RA | dB | -3 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note1 | dB | | | | |
| OCNG_RB Note1 | dB | | | | |
| SNR Note 6,7 | dB | -1.3 | -5.4 | -12.4 | 5 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 |
| Propagation condition | | ETU 30 Hz | | | ETU 30 Hz |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal quality, signal-to-interference-plus-noise ratio, on the CRS REs.
Note 6: The SNR in the restricted measurement subframes during time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3. 9.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

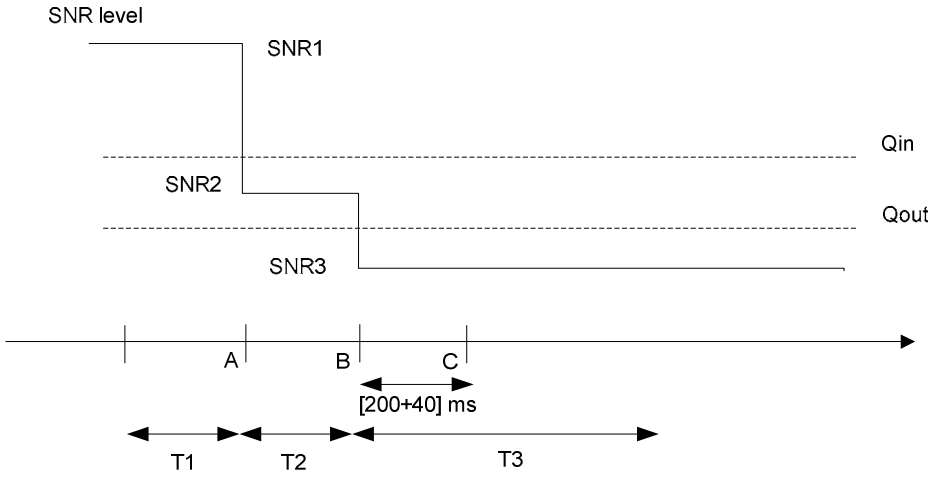


**Figure A.7.3.9.1-1 SNR variation for out-of-sync testing**

## A.7.3.9.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.10 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction with Non-MBSFN ABS

## A.7.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.10.1-1 and A.7.3.10.1-2 below. There are two cells, cell 1 is the serving cell and cell 2 is the neigbhor aggressor cell. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.10.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

Non-MBSFN ABS pattern is configured in Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.10.1-1: General test parameters for E-UTRAN TDD out-of-sync testing under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.9 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Serving cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cell | | | Cell 2 | Cell 2 is the aggressor cell on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Physical cell ID PCI | | | ($PCI_{cell1}$-$PCI_{cell2}$ )mod3 != 0 | Cell IDs are chosen such that CRS from cells 1 and 2 do not overalp in frequency. |

| | | | |
|---|---|---|---|
| ABS pattern | | 10000000001000000000 | TDD ABS Pattern Info IE is configured in Cell 2 as defined in clause 9.2.54 in TS 36.423 [28].<br>The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10.<br>No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | 10000000001000000000 | MeasSubframePattern IE is configured in UE for serving cell measurement as defined in clause 6.3.6 in TS 36.331. |
| DRX | | OFF | |
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 0 | T310 is disabled |
| T311 timer | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 1 | Minimum CQI reporting periodicity |
| Time offset between cells | µs | 3 | |
| Propagation channel | | ETU30 | |
| T1 | s | 1 | |
| T2 | s | 0.4 | |
| T3 | s | 0.5 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.10.1-2: Cell specific test parameters for E-UTRAN TDD for out-of-sync radio link monitoring under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | OP.2 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. | | |
| PDCCH_RA | dB | 1 | | | | | |
| PDCCH_RB | dB | 1 | | | | | |
| PBCH_RA | dB | -3 | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 3] | dB | | | | | | |
| OCNG_RB[Note 3] | dB | | | | | | |
| SNR [Note 8,9] | dB | -1.3 | -5.4 | -12.4 | 5 | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU30 | | | ETU30 | | |

| | |
|---|---|
| Note 1: | For the special subframe configuration see table 4.2-1 in TS 36.211. |
| Note 2: | For the uplink-downlink configuration see table 4.2-2 in TS 36.211. |
| Note 3: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 5: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 6: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 7: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 8: | The SNR in time periods T1, T2 and T3 of active cell is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.10.1-1. |
| Note 9: | The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1. |

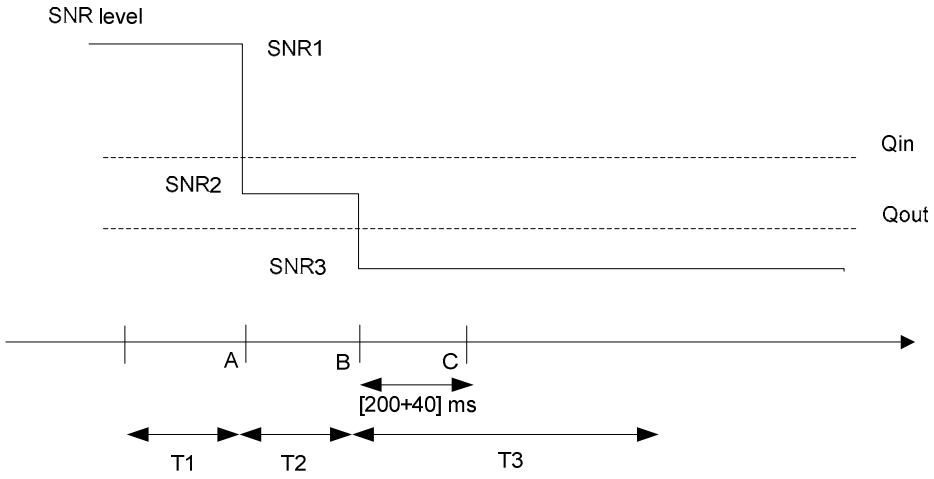


**Figure A.7.3.10.1-1 SNR variation in active cell for out-of-sync testing under time domain measurement resource restriction with non-MBSFN ABS**

### A.7.3.10.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.11 E-UTRAN FDD Radio Link Monitoring Test for In-sync for Non-MBSFN ABS

### A.7.3.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.11.1-1 and A.7.3.11.1-2 below. There are two cells in the test: Cell 1 is the Active cell and Cell 2 is the Neighbor cell. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.11.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.11.1-1: General test parameters for E-UTRAN FDD in-sync testing under time domain measurement resource restriction**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.9 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.6 FDD | As specified in clause A.3.2.1.6. |
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cell | | | Cell 2 | Cell 2 is on E-UTRA RF channel number 1; Cell 2 generates interference over restricted resources. |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-2 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters for the active cell (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | In sync threshold Qin and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | -3 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters for active cell (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |

| | | | |
|---|---|---|---|
| CQI reporting periodicity | ms | 2 | Minimum CQI reporting periodicity |
| Time offset between cells | µs | 3 | |
| Propagation channel | | ETU30 | |
| T1 | s | 0.5 | |
| T2 | s | 0.4 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 1 | |
| Physical cell ID PCI | | ($PCI_{cell1}$-$PCI_{cell2}$)mod3 != 0 | Cell IDs are chosen such that CRS from cells 1 and 2 do not overalp in frequency |
| ABS pattern | | '10000000 100000001 000000010 000000100 00000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2.<br>The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10.<br>No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | '10000000 100000001 000000010 000000100 00000' | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.11.1-2: Cell specific test parameters for E-UTRAN FDD for in-sync radio link monitoring under time domain measurement resource restriction**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | | | | |
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | | | | | R.9 FDD | | | | |
| Number of Control OFDM symbols | | 3 | | | | | 3 | | | | |
| OCNG Pattern defined in A.3.2.1.6 (FDD) | | OP.6 FDD | | | | | OP.6 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | | | |
| PDCCH_RA | dB | -3 | | | | | | | | | |
| PDCCH_RB | dB | -3 | | | | | | | | | |
| PBCH_RA | dB | -3 | | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| SNR Note 6,7 | dB | -1.3 | -5.4 | -12.4 | -7.3 | -1.3 | 5 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 |
| Propagation condition | | ETU30 | | | | | ETU30 |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 of the active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.11.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

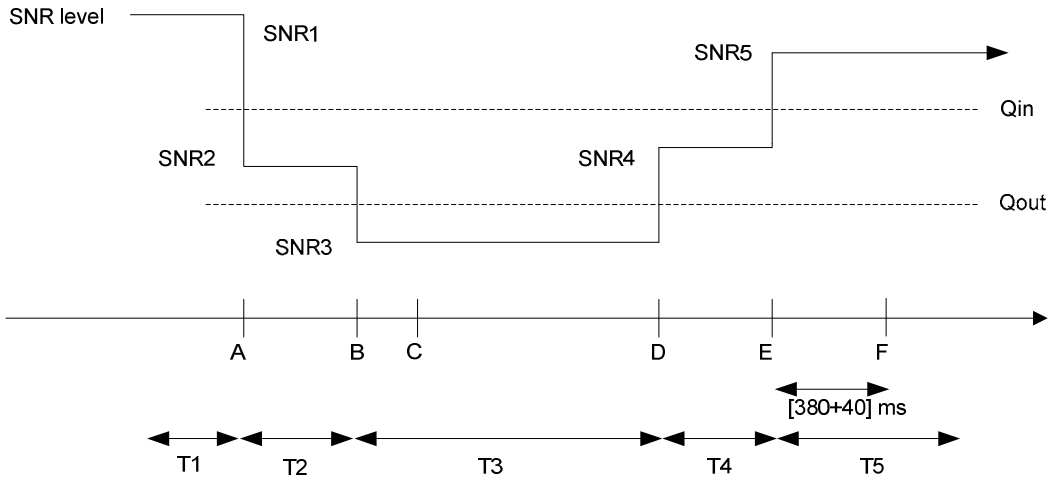


**Figure A.7.3.11.1-1 SNR variation in the active cell for in-sync testing under time domain measurement resource restriction**

### A.7.3.11.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.12 E-UTRAN TDD Radio Link Monitoring Test for In-sync for Non-MBSFN ABS

### A.7.3.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.12.1-1 and A.7.3.12.1-2 below. There are two cells in the test: Cell 1 is the Active cell and Cell 2 is the Neighbor cell. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.12.1-1 shows the variation of the downlink SNR in the active cell to

emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

Non-MBSFN ABS pattern is configured in the aggressor Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.12.1-1: General test parameters for E-UTRAN TDD in-sync testing under time domain measurement resource restriction**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.9 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | As specified in clause A.3.2.2.2. |
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cell | | | Cell 2 | Cell 2 is on E-UTRA RF channel number 1; Cell 2 generates interference over restricted resources. |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-2 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters for the active cell (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | In sync threshold Qin and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | -3 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters for active cell (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |

| | | | |
|---|---|---|---|
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 1 | Minimum CQI reporting periodicity |
| Time offset between cells | µs | 3 | |
| Propagation channel | | ETU30 | |
| T1 | s | 0.5 | |
| T2 | s | 0.4 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 1 | |
| Physical cell ID PCI | | ($PCI_{cell1}$-$PCI_{cell2}$)mod3 != 0 | Cell IDs are chosen such that CRS from cells 1 and 2 do not overalp in frequency |
| ABS pattern | | 1000000000<br>1000000000 | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10.<br>No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | 1000000000<br>1000000000 | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. Configured in Cell 1. |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.12.1-2: Cell specific test parameters for E-UTRAN TDD for in-sync radio link monitoring under time domain measurement resource restriction**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | | | | |
| Special subframe configuration[Note1] | | 6 | | | | | 6 | | | | |
| Uplink-downlink configuration[Note2] | | 1 | | | | | 1 | | | | |
| PCFICH/PDCCH/PHICH parameters | | R.9 TDD | | | | | R.9 TDD | | | | |
| Number of Control OFDM symbols | | 3 | | | | | 3 | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | | OP.2 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. |
| PDCCH_RA | dB | -3 | | | | | |
| PDCCH_RB | dB | -3 | | | | | |
| PBCH_RA | dB | -3 | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 3 | dB | | | | | | |
| OCNG_RB Note 3 | dB | | | | | | |
| SNR Note 8,9 | dB | -1.3 | -5.4 | -12.4 | -7.3 | -1.3 | 5 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 |
| Propagation condition | | ETU30 | | | | | ETU30 |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 of active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.12.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

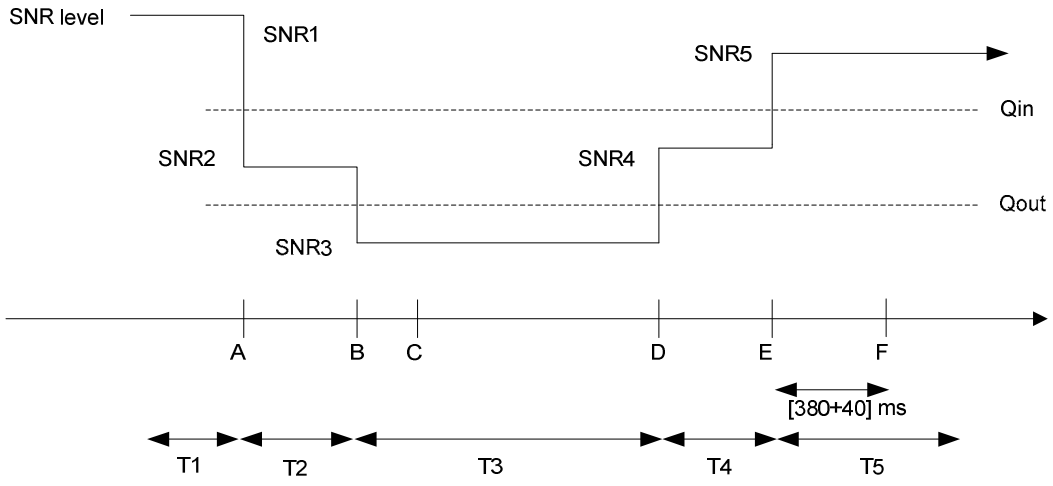


**Figure A.7.3.12.1-1 SNR variation in active cell for in-sync testing under time domain measurement resource restriction**

## A.7.3.12.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink subframes configured for CQI transmission according to the configured CQI mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.13 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction with MBSFN ABS

## A.7.3.13.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.13.1-1 and A.7.3.13.1-2 below. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.13.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

MBSFN ABS pattern is configured in the aggressor Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.13.1-1: General test parameters for E-UTRAN FDD out-of-sync testing under time domain measurement resource restriction with MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.9.FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.6 FDD for the serving cell (Cell 1) OP.9 FDD for the neighbour cell (Cell 2) | As specified in clause A.3.2.1.6 and A.3.2.1.9 respectively |
| Serving cell (PCell) | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cell | | | Cell 2 | Aggressor cell on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | MBSFN ABS | As defined in Table A.3.4.2.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| Time offset between cells | | | 3 μs | Synchronous cells |

| | | | |
|---|---|---|---|
| T1 | s | 1 | |
| T2 | s | 0.4 | |
| T3 | s | 0.5 | |
| Physical cell ID PCI | | ($PCI_{cell1}$-$PCI_{cell2}$ ) mod 3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell IDs are chosen such that CRS from cells 1 and 2 overlap in frequency |
| ABS pattern | | '01000000100000001000 00000010000001000000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2. The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | '01000000100000001000 00000010000001000000' | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePattern-Serv-r10 as defined in TS 36.331, clause 6.3.2. |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel | | | |

**Table A.7.3.13.1-2: Cell specific test parameters for E-UTRAN FDD for out-of-sync radio link monitoring under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.6 FDD | | | OP.9 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-1. | | |
| PDCCH_RA | dB | 1 | | | | | |
| PDCCH_RB | dB | 1 | | | | | |
| PBCH_RA | dB | -3 | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note1] | dB | | | | | | |
| OCNG_RB[Note1] | dB | | | | | | |
| SNR [Note 6,7] | dB | -1.3 | -5.4 | -12.4 | 5 | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 30 Hz | | | ETU 30 Hz | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 3: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 4: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 5: | SNR levels correspond to the signal quality, signal-to-interference-plus-noise ratio, on the CRS REs. |
| Note 6: | The SNR in the restricted measurement subframes during time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.13.1-1. |
| Note 7: | The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1. |

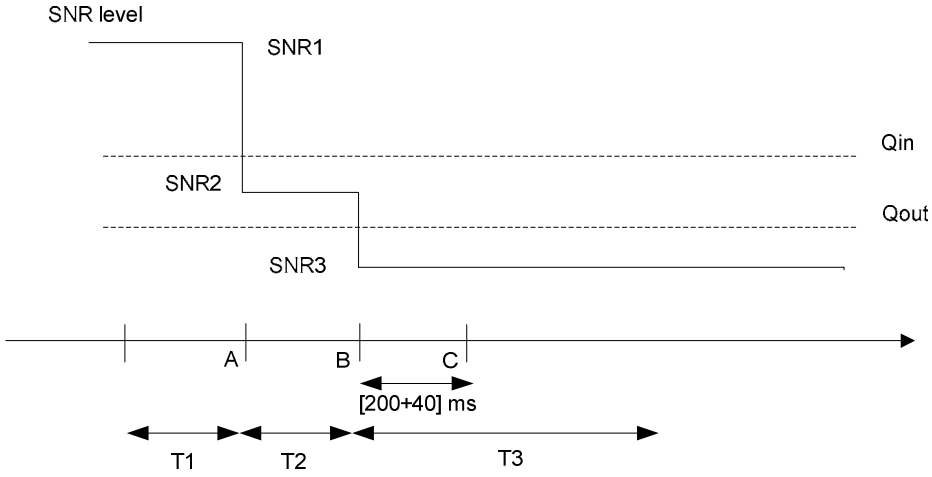


**Figure A.7.3.13.1-1 SNR variation for out-of-sync testing**

### A.7.3.13.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.14 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction with MBSFN ABS

### A.7.3.14.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.14.1-1 and A.7.3.14.1-2 below. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.14.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

MBSFN ABS pattern is configured in the aggressor Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.14.1-1: General test parameters for E-UTRAN TDD out-of-sync testing under time domain measurement resource restriction with MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.9.TDD | As specified in clause A.3.1.2.1.<br>None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD for the serving cell (Cell 1)<br>OP.6 TDD for the neighbour cell (Cell 2) | As specified in clause A.3.2.2.2 and A.3.2.2.6 respectively |
| Serving cell (PCell) | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cell | | | Cell 2 | Aggressor cell on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | MBSFN ABS | As defined in Table A.3.4.2.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| Time offset between cells | | | 3 μs | Synchronous cells |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Physical cell ID PCI | | | ($PCI_{cell1}$-$PCI_{cell2}$ ) mod 3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell IDs are chosen such that CRS from cells 1 and 2 overlap in frequency |
| ABS pattern | | | '00001000000000100000' | MBSFN ABS. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2.<br>The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. All ABS subframes are MBSFN subframes. |

| | | | |
|---|---|---|---|
| Time domain measurement resource restriction pattern | | '00001000000000100000' | Time-domain measurement resource restriction pattern for serving cell measurements signalled to the UE in message measSubframePattern-Serv-r10 as defined in TS 36.331, clause 6.3.2. |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel | | | |

**Table A.7.3.14.1-2: Cell specific test parameters for E-UTRAN TDD for out-of-sync radio link monitoring under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | OP.6 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-1. | | |
| PDCCH_RA | dB | 1 | | | | | |
| PDCCH_RB | dB | 1 | | | | | |
| PBCH_RA | dB | -3 | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note3] | dB | | | | | | |
| OCNG_RB[Note3] | dB | | | | | | |
| SNR [Note 7,8,9] | dB | -1.3 | -5.4 | -12.4 | 5 | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 30 Hz | | | ETU 30 Hz | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink subframe configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal quality, signal-to-interference-plus-noise ratio, on the CRS REs.
Note 8: The SNR in the restricted measurement subframes during time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.7.3.14.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

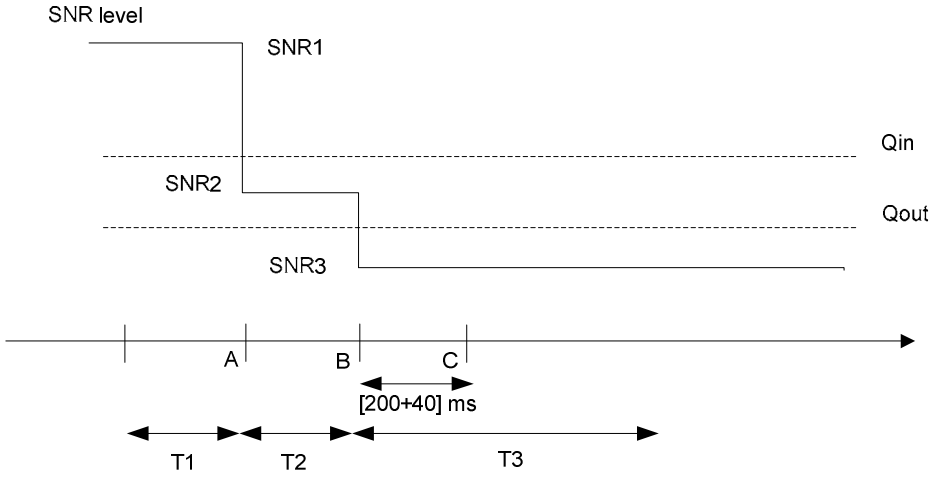


**Figure A.7.3.14.1-1 SNR variation for out-of-sync testing**

### A.7.3.14.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.15 E-UTRAN FDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resource Restriction with MBSFN ABS

### A.7.3.15.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.15.1-1 and A.7.3.15.1-2 below. There are two cells, cell 1 is the serving cell and cell 2 is the neighbour aggressor cell. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.15.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

MBSFN ABS pattern is configured in Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.15.1-1: General test parameters for E-UTRAN FDD in-sync testing under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| Serving cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is the aggressor cell on E-UTRA RF channel number 1 |
| Neighbour cell ABS configuration | | MBSFN ABS | As defined in Table A.3.4.2.2-2 |

| | | | | |
|---|---|---|---|---|
| OCNG parameters for Cell 1 | | | OP.6 FDD | As specified in clause A.3.2.1.6. |
| OCNG parameters for Cell 2 | | | OP.9 FDD | As specified in clause A.3.2.1.9. |
| CP length | | | Normal | |
| Neighbor cell ABS configuration | | | MBSFN ABS | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | In sync threshold Qin and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | -3 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Physical cell ID PCI | | | ($PCI_{cell1}$-$PCI_{cell2}$ ) mod 3 = 0, PCIcell1 not equal to PCIcell2 | Cell IDs are chosen such that CRS from cells 1 and 2 overlap in frequency. |
| ABS pattern | | | 01000000100000001000000000010000000001000000 | FDD ABS Pattern Info IE is configured in Cell 2 as defined in clause 9.2.54 in TS 36.423 [28]. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. All ABS subframes are MBSFN subframes. |
| Time domain measurement resource restriction pattern | | | 01000000100000001000000000010000000001000000 | MeasSubframePattern IE is configured in UE for serving cell measurement as defined in clause 6.3.6 in TS 36.331. |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| Time offset between cells | | µs | 3 | |
| Propagation channel | | | ETU30 | |

| | | | |
|---|---|---|---|
| T1 | s | 0.5 | |
| T2 | s | 0.4 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.15.1-2: Cell specific test parameters for E-UTRAN FDD for in-sync radio link monitoring under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.6 FDD | | | | | OP.9 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-2. | | | | |
| PDCCH_RA | dB | -3 | | | | | | | | | |
| PDCCH_RB | dB | -3 | | | | | | | | | |
| PBCH_RA | dB | -3 | | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| SNR Note 6,7 | dB | -1.3 | -5.4 | -12.4 | -7.3 | -1.3 | 5 | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | | | | |
| Propagation condition | | ETU30 | | | | | ETU30 | | | | |

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 of the active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.15.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

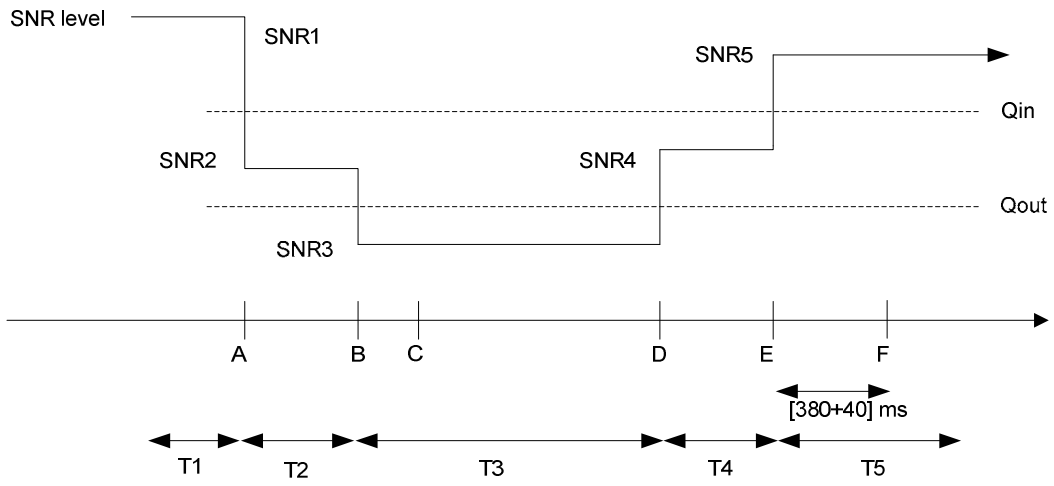


**Figure A.7.3.15.1-1 SNR variation in the active cell for in-sync testing under time domain measurement resource restriction with MBSFN ABS**

### A.7.3.15.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.16 E-UTRAN TDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resource Restriction with MBSFN ABS

### A.7.3.16.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction when CRS assistance information is not provided. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.16.1-1 and A.7.3.16.1-2 below. There are two cells, cell 1 is the serving cell and cell 2 is the neighbour aggressor cell. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.15.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

MBSFN ABS pattern is configured in Cell 2 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing serving cell measurements. The patterns shall be configured prior to the start of T1.

**Table A.7.3.16.1-1: General test parameters for E-UTRAN TDD in-sync testing under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.9 TDD | As specified in clause A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| Serving cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is the aggressor cell on E-UTRA RF channel number 1 |

| | | | | |
|---|---|---|---|---|
| Neighbour cell ABS configuration | | | MBSFN ABS | As defined in Table A.3.4.2.2-2 |
| OCNG parameters for Cell 1 | | | OP.2 TDD | As specified in clause A.3.2.2.2. |
| OCNG parameters for Cell 2 | | | OP.6 TDD | As specified in clause A.3.2.2.6. |
| CP length | | | Normal | |
| Neighbor cell ABS configuration | | | MBSFN ABS | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | In sync threshold Qin and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | -3 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Physical cell ID PCI | | | ($PCI_{cell1}$-$PCI_{cell2}$ ) mod 3 = 0, PCIcell1 not equal to PCIcell2 | Cell IDs are chosen such that CRS from cells 1 and 2 overlap in frequency. |
| ABS pattern | | | 00001000000000100000 | TDD ABS Pattern Info IE is configured in Cell 2 as defined in clause 9.2.54 in TS 36.423 [28]. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. All ABS subframes are MBSFN subframes. |
| Time domain measurement resource restriction pattern | | | 00001000000000100000 | MeasSubframePattern IE is configured in UE for serving cell measurement as defined in clause 6.3.6 in TS 36.331. |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |

| | | | |
|---|---|---|---|
| Time offset between cells | µs | 3 | |
| Propagation channel | | ETU30 | |
| T1 | s | 0.5 | |
| T2 | s | 0.4 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.16.1-2: Cell specific test parameters for E-UTRAN TDD for in-sync radio link monitoring under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | | | | |
| Special subframe configuration[Note1] | | 6 | | | | | 6 | | | | |
| Uplink-downlink configuration[Note2] | | 1 | | | | | 1 | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | | OP.6 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-2. | | | | |
| PDCCH_RA | dB | -3 | | | | | | | | | |
| PDCCH_RB | dB | -3 | | | | | | | | | |
| PBCH_RA | dB | -3 | | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | |
| SNR [Note 8,9] | dB | -1.3 | -5.4 | -12.4 | -7.3 | -1.3 | 5 | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | | | | |
| Propagation condition | | ETU30 | | | | | ETU30 | | | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 of the active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.16.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

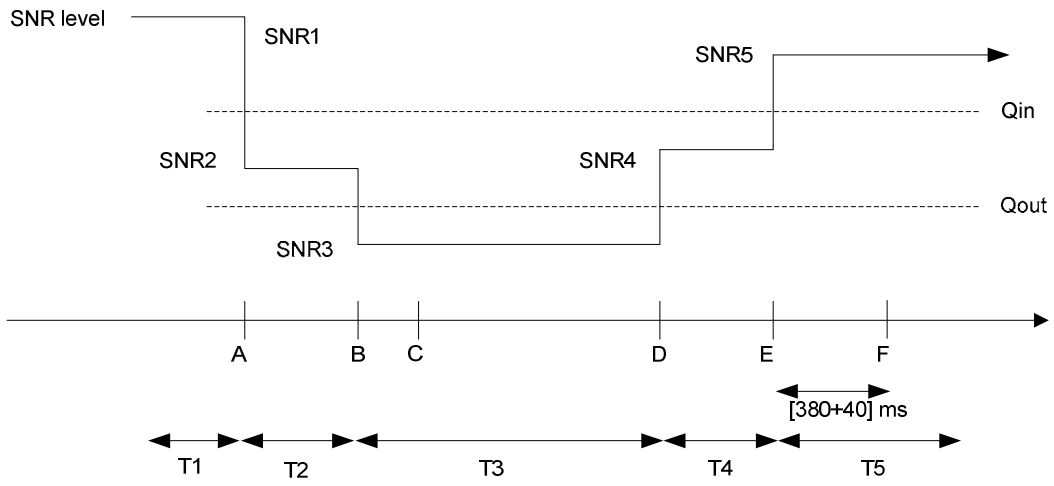


**Figure A.7.3.16.1-1 SNR variation in the active cell for in-sync testing under time domain measurement resource restriction with MBSFN ABS**

### A.7.3.16.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.17 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.7.3.17.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell under time domain measurement resource restriction with CRS assistance information. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.17.1-1 and A.7.3.17.1-2 below. There are three active cells in the test: Cell 1 is the PCell cell and Cell 2 and 3 are the neighbour cells. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.17.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing Pcell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2 and T3 in this test. The non-MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.17.1-1: General test parameters for E-UTRAN FDD out-of-sync testing under time domain measurement resource restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.7 FDD | As specified in clause A.3.1.2.1.<br>None of the PDCCH are intended for the UE under test |
| OCNG parameters | | OP.6 FDD | As specified in section A.3.2.1.6. |
| PCell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |

| | | | | |
|---|---|---|---|---|
| Neighbor cells | | | Cell 2 and Cell 3 | Both of aggressor cells on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| Time offset between cells | | μs | Cell 2 time offset with respect to Cell 1: 3<br>Cell 3 time offset with respect to Cell 1: 2 | Three synchronous cells |
| Frequency shift between cells | | Hz | Cell 2 frequency shift with respect to Cell 1: 300<br>Cell 3 frequency shift with respect to Cell 1: -100 | |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Physical cell IDs | | | $(PCI_{cell1}-PCI_{cell2})mod3 = 0$<br>$(PCI_{cell1}-PCI_{cell3})mod3!= 0$<br>$PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | | '10000000100000001000000010000000010000000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Configured in both Cell 2 and Cell 3 prior to the start of T1. |
| Time domain measurement resource restriction pattern | | | '10000000100000001000000010000000010000000' | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 and Cell 3 in *CRS-AssistanceInfo*. It includes a single *MBSFN-SubframeConfig* |
| | antennaPortsCount | | an2 | |

| | | | | |
|---|---|---|---|---|
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | element with subframe allocation *oneFrame*='000000' |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel | | | | |

**Table A.7.3.17.1-2: Cell specific test parameters for E-UTRAN FDD for out-of-sync radio link monitoring under time domain measurement resource restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | Cell 3 |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1-T3 | T1-T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | 10 | 10 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | 2x2 Low |
| OCNG Pattern defined in A.3.2.1.6 (FDD) | | OP.6 FDD | | | OP.6 FDD | OP.6 FDD |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note1] | dB | | | | | |
| OCNG_RB[Note1] | dB | | | | | |
| SNR [Note 6,7] | dB | -1.5 | -5.2 | -13.7 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | -98 |
| Propagation condition | | ETU 30 Hz | | | ETU 30 Hz | ETU 30 Hz |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal quality, signal-to-interference-plus-noise ratio, on the CRS REs.
Note 6: The SNR in the restricted measurement subframes during time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.17.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

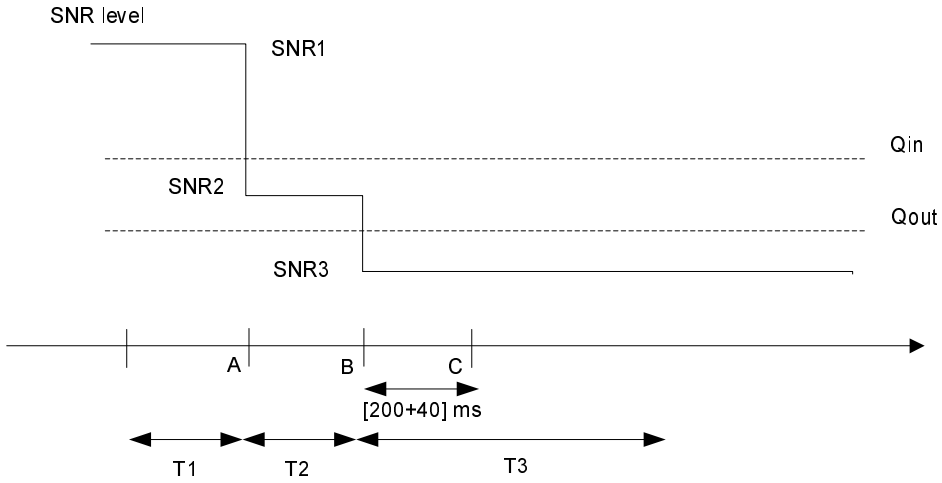


**Figure A.7.3.17.1-1 SNR variation for out-of-sync testing**

### A.7.3.17.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.18 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.7.3.18.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the serving cell under time domain measurement resource restriction with CRS assistance information. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.18.1-1 and A.7.3.18.1-2 below. There are three active cells in the test: Cell 1 is the PCell cell and Cell 2 and 3 are the neighbour cells. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.18.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing Pcell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2 and T3 in this test. The non-MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.18.1-1: General test parameters for E-UTRAN TDD out-of-sync testing under time domain measurement resource restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.7.TDD | As specified in clause A.3.1.2.2.<br>None of the PDCCH are intended for the UE under test |
| OCNG parameters | | OP.2 TDD | As specified in clause A.3.2.2.2 |

| | | | | |
|---|---|---|---|---|
| PCell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| Neighbor cells | | | Cell 2 and Cell 3 | Both of aggressor cells on E-UTRA RF channel number 1 |
| Neighbor cell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.2-1 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| Time offset between cells | | µs | Cell 2 time offset with respect to Cell 1: 3<br>Cell 3 time offset with respect to Cell 1: 2 | Three synchronous cells |
| Frequency shift between cells | | Hz | Cell 2 frequency shift with respect to Cell 1: 300<br>Cell 3 frequency shift with respect to Cell 1: -100 | |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Physical cell IDs | | | $(PCI_{cell1}-PCI_{cell2})mod3 = 0$<br>$(PCI_{cell1}-PCI_{cell3})mod3!= 0$<br>$PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | | '00001000000000100000' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the PCell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Configured in both Cell 2 and Cell 3 prior to the start of T1. |
| Time domain measurement resource restriction pattern | | | '00001000000000100000' | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 only in *CRS-AssistanceInfo*. It includes a |
| | antennaPortsCount | | an2 | |

| | | | | |
|---|---|---|---|---|
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | single *MBSFN-SubframeConfig* element with subframe allocation *oneFrame*='000000' |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel | | | | |

**Table A.7.3.18.1-2: Cell specific test parameters for E-UTRAN TDD for out-of-sync radio link monitoring under time domain measurement resource restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | | Cell 2 | Cell 3 |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1-T3 | T1-T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | | | 6 | 6 |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | 2x2 Low |
| OCNG Pattern defined in A.3.2.2.2 (TDD) | | OP.2 TDD | | | OP.2 TDD | OP.2 TDD |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-1. |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note1] | dB | | | | | |
| OCNG_RB[Note1] | dB | | | | | |
| SNR [Note 6,9] | dB | -1.5 | -5.2 | -13.7 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | -98 |
| Propagation condition | | ETU 30 Hz | | | ETU 30 Hz | ETU 30 Hz |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink subframe configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal quality, signal-to-interference-plus-noise ratio, on the CRS REs.
Note 8: The SNR in the restricted measurement subframes during time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.7.3.18.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1.

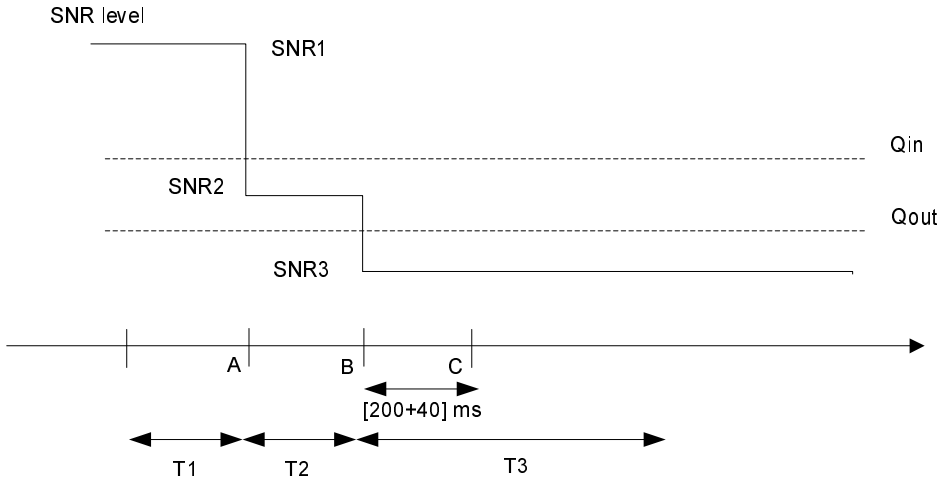


**Figure A.7.3.18.1-1 SNR variation for out-of-sync testing**

### A.7.3.18.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.19 E-UTRAN FDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resouce Restriction with CRS assistance information and Non-MBSFN ABS

### A.7.3.19.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell under time domain measurement resource restriction with CRS assistance information. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in section 7.6.

The test parameters are given in Tables A.7.3.19.1-1 and A.7.3.19.1-2 below. There are three active cells in the test: Cell 1 is the PCell cell and Cell 2 and 3 are the neighbour cells. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.19.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing PCell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2, T3, T4 and T5 in this test. The Non-MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.19.1-1: General test parameters for E-UTRAN FDD in-sync radio link monitoring test**

| Parameter | Unit | Value | | | Comment |
|---|---|---|---|---|---|
| | | Test 1 | | | |
| | | Cell 1 | Cell 2 | Cell 3 | |
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | R.9 FDD | R.9 FDD | As specified in section A.3.1.2.1. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | | OP.6 FDD | OP.6 FDD | OP.6 FDD | As specified in section A.3.2.1.6. |
| Active cell | | | | PCell | Neighbor Cell | Neighbor Cell | Cell 1, Cell 2 and Cell 3 are on E-UTRA RF channel number 1 |
| CP length | | | | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | | | 1 | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | | MHz | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | | 2x2 Low | 2x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Neighbor Cell ABS configuration | | | | N/A | Non-MBSFN ABS | | As defined in Table A.3.4.1.2-2 |
| ABS Pattern | | | | N/A | '10000000100000000100000000100000000' | '10000000100000000100000000100000000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are cofigured in the ABS subframes. Configured in both Cell 2 and Cell 3 prior to the start of T1. |
| Time domain measurement resource restriction pattern | | | | '10000000100000000100000000100000000' | N/A | N/A | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| CRS assistant information | physCellId | | | N/A | see PCI conditions below | see PCI conditions below | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation oneFrame='000000' |
| | antennaPortsCount | | | | an2 | an2 | |
| | mbsfn-SubframeConfigList | | | | oneFrame = '000000' | oneFrame = '000000' | |
| Time offset between cells (With respect to Cell 1) | | | us | 0 | 3 | 2 | |
| Frequency shift between cells (With respect to Cell 1) | | | Hz | 0 | 300 | -100 | |
| Physical Cell ID | | | | $PCI_{cell1}$ | ($PCI_{cell1}$-$PCI_{cell2}$) mod3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | ($PCI_{cell1}$-$PCI_{cell3}$) mod3! = 0 | Cell PCIs are selected so that all conditions are met |
| In sync transmission parameters (Note 1) | | | DCI format | 1C | 1C | 1C | |
| In sync transmission | Number of Control OFDM symbols | | | 3 | 3 | 3 | As defined in section 5.3.3.1.4 in TS 36.212 |

| | | | | | | |
|---|---|---|---|---|---|---|
| parameters (Note 1) | Aggregation level | CCE | 4 | 4 | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section and Table 7.6.1-2 respectively. |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | | -3 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | | 1 | | | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | |
| | Number of Control OFDM symbols | | 3 | 3 | 3 | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Aggregation level | CCE | 8 | 8 | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | | | |
| DRX | | | OFF | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Disable | Disable | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | N/A | | T310 is enabled |
| T311 timer | | ms | 1000 | | | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | | | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | | | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | N/A | | |
| T2 | | s | 0.4 | | | |
| T3 | | s | 1.46 | | | |
| T4 | | s | 0.4 | | | |
| T5 | | s | 1 | | | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | | |

**Table A.7.3.19.1-2: Cell specific test parameters for E-UTRAN FDD in-sync radio link monitoring test**

| Parameter | Unit | Test 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cell1 | | | | | Cell2 | Cell3 |
| | | T1 | T2 | T3 | T4 | T5 | T1-T5 | T1-T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | 10 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | 2x2 Low |
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | | | | | R.9 FDD | R.9 FDD |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.6 FDD | | | | | OP.6 FDD | OP.6 FDD |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | |
| PDCCH_RA | dB | -3 | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PBCH_RA | dB | | | | | | | |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| SNR Note 6,7 | dB | -1.5 | -5.2 | -13.7 | -8.6 | -1.5 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | -98 |
| Propagation condition | Hz | ETU 30 | | | | | ETU 30 | ETU 30 |

Note 1: OCNG shall be used such that the resources in cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.19.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

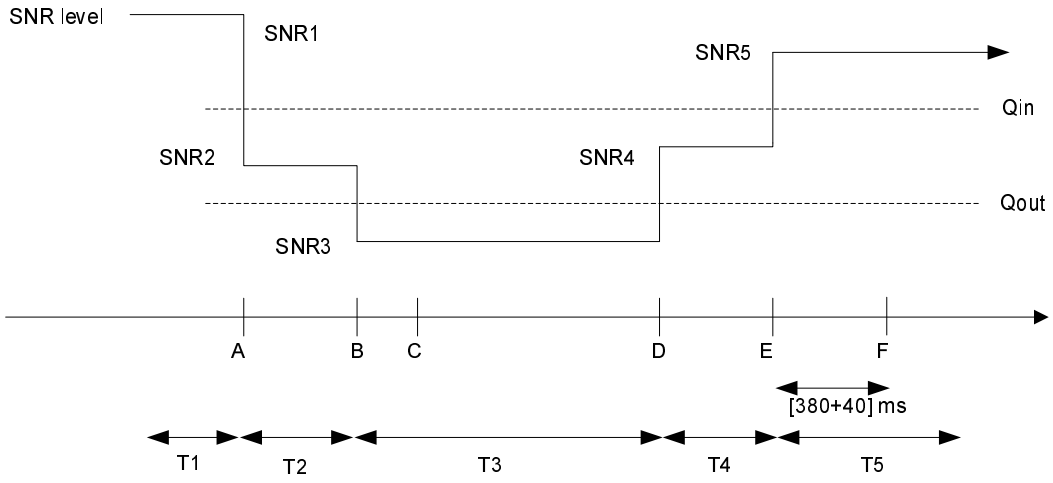


**Figure A.7.3.19.1-1 SNR variation for in-sync testing**

### A.7.3.19.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.20 E-UTRAN TDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resouce Restriction with CRS assistance information and Non-MBSFN ABS

### A.7.3.20.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell under time domain measurement resource restriction with CRS assistance information. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in section 7.6.

The test parameters are given in Tables A.7.3.20.1-1 and A.7.3.20.1-2 below. There are three active cells in the test: Cell 1 is the PCell and Cell 2 and 3 are the Neighbor cells. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.20.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

Non-MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing PCell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2, T3, T4 and T5 in this test. The Non-MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.20.1-1: General test parameters for E-UTRAN TDD in-sync radio link monitoring test**

| Parameter | | Unit | Value | | | Comment |
|---|---|---|---|---|---|---|
| | | | Test 1 | | | |
| | | | Cell 1 | Cell 2 | Cell 3 | |
| PCFICH/PDCCH/PHICH parameters | | | R.9 TDD | R.9 TDD | R.9 TDD | As specified in section A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.2 TDD | OP.2 TDD | OP.2 TDD | As specified in section A.3.2.2.2. |
| Active cell | | | PCell | Neighbor Cell | Neighbor Cell | Cell 1, Cell 2 and Cell 3 are on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | 2x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Neighbor Cell ABS configuration | | | N/A | Non-MBSFN ABS | | As defined in Table A.3.4.1.2-1 |
| ABS Pattern | | | N/A | '00001000000000100000' | '00001000000000100000' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2 and Cell 3. The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | | '00001000000000100000' | N/A | N/A | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| CRS assistant information | physCellId | | N/A | see PCI conditions below | see PCI conditions below | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS- |

| | | | | | | |
|---|---|---|---|---|---|---|
| | antennaPorts Count | | | an2 | an2 | AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation oneFrame='000000' |
| | mbsfn-SubframeConfigList | | | oneFrame = '000000' | oneFrame = '000000' | |
| Time offset from Cell 1 | | us | 0 | 3 | 2 | |
| Frequency offset | | Hz | 0 | 300 | -100 | |
| Physical Cell ID | | | $PCI_{cell1}$ | ($PCI_{cell1}$-$PCI_{cell2}$) mod3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | ($PCI_{cell1}$-$PCI_{cell3}$) mod3! = 0 | Cell PCIs are selected so that all conditions are met |
| In sync transmission parameters (Note 1) | DCI format | | 1C | 1C | 1C | As defined in section 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | 3 | 3 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | 4 | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | | -3 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | | 1 | | | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 3 | 3 | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | | | |
| DRX | | | OFF | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Disable | Disable | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | N/A | | T310 is enabled |
| T311 timer | | ms | 1000 | | | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | | | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | | | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | N/A | | |
| T2 | | s | 0.4 | | | |
| T3 | | s | 1.46 | | | |
| T4 | | s | 0.4 | | | |
| T5 | | s | 1 | | | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | | |

**Table A.7.3.20.1-2: Cell specific test parameters for E-UTRAN TDD in-sync radio link monitoring test**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell3 |

| | | T1 | T2 | T3 | T4 | T5 | T1-T5 | T1-T5 |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | 10 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | 2x2 Low |
| Special subframe configuration Note 1 | | 6 | | | | | 6 | 6 |
| Uplink-downlink configuration Note 2 | | 1 | | | | | 1 | 1 |
| PCFICH/PDCCH/PHICH parameters | | R.9 TDD | | | | | R.9 TDD | R.9 TDD |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | | OP.2 TDD | OP.2 TDD |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | |
| PDCCH_RA | dB | -3 | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PBCH_RA | dB | | | | | | | |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 3 | dB | | | | | | | |
| OCNG_RB Note 3 | dB | | | | | | | |
| SNR Note 8,9 | dB | -1.5 | -5.2 | -13.7 | -8.6 | -1.5 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | -98 |
| Propagation condition | Hz | ETU 30 | | | | | ETU 30 | ETU 30 |

Note 1: For the special subframe configuration see table 4.2-1 in 3GPP TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in 3GPP TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 of active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.20.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

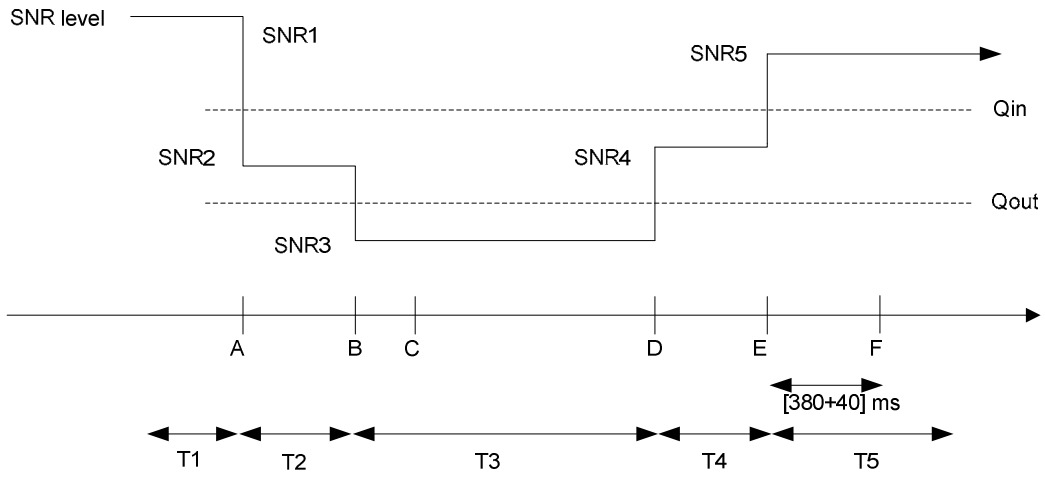


**Figure A.7.3.20.1-1 SNR variation for in-sync testing**

### A.7.3.20.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.21 E-UTRAN FDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resouce Restriction with CRS assistance information and MBSFN ABS

### A.7.3.21.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell under time domain measurement resource restriction with CRS assistance information and MBSFN ABS. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in section 7.6.

The test parameters are given in Tables A.7.3.21.1-1 and A.7.3.21.1-2 below. There are three active cells in the test: Cell 1 is the PCell cell and Cell 2 and 3 are the neighbour cells. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.21.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing PCell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2, T3, T4 and T5 in this test. The MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.21.1-1: General test parameters for E-UTRAN FDD in-sync radio link monitoring test**

| Parameter | Unit | Value | | | Comment |
|---|---|---|---|---|---|
| | | Test 1 | | | |
| | | Cell 1 | Cell 2 | Cell 3 | |
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | R.9 FDD | R.9 FDD | As specified in section A.3.1.2.1. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.6 FDD | OP.9 FDD | OP.9 FDD | As specified in section A.3.2.1. |
| Active cell | | | PCell | Neighbor Cell | Neighbor Cell | Cell 1, Cell 2 and Cell 3 are on E-UTRA RF channel number 1 |
| CP length | | | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | | 1 | 1 | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | 2x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Neighbor Cell ABS configuration | | | N/A | MBSFN ABS | | As defined in Table A.3.4.2.2-2 |
| ABS Pattern | | | N/A | '0100000010000000100000000100000100000' | '0100000010000000100000000100000100000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. MBSFN subframes are cofigured in the ABS subframes configured in Cell 2 and Cell 3 prior to the start of T1. |
| Time domain measurement resource restriction pattern | | | '0100000010000000100000000100000100000' | N/A | N/A | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |
| CRS assistance information | physCellId | | N/A | see PCI conditions below | see PCI conditions below | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation fourFrames = '10000100010000010000100000' |
| | antennaPortsCount | | | an2 | an2 | |
| | mbsfn-SubframeConfigList | | | fourFrames = '10000100010000010000100000' | fourFrames = '10000100010000010000100000' | |
| Time offset between cells (With respect to Cell 1) | | us | 0 | 3 | 2 | |
| Frequency shift between cells (With respect to Cell 1) | | Hz | 0 | 300 | -100 | |
| Physical Cell ID | | | $PCI_{cell1}$ | ($PCI_{cell1}$-$PCI_{cell2}$) mod3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | ($PCI_{cell1}$-$PCI_{cell3}$) mod3 != 0 | Cell PCIs are selected so that all conditions are met |
| In sync transmission parameters (Note 1) | | DCI format | 1C | 1C | 1C | |
| | Number of Control | | 3 | 3 | 3 | As defined in section 5.3.3.1.4 in TS 36.212 |

| | | | | | | |
|---|---|---|---|---|---|---|
| In sync transmission parameters (Note 1) | OFDM symbols | | | | | |
| | Aggregation level | CCE | 4 | 4 | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section and Table 7.6.1-2 respectively. |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | | -3 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-2. | | |
| | Ratio of PCFICH to RS EPRE | | 1 | | | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | |
| | Number of Control OFDM symbols | | 3 | 3 | 3 | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Aggregation level | CCE | 8 | 8 | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-2. | | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | | | |
| DRX | | | OFF | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Disable | Disable | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | N/A | | T310 is enabled |
| T311 timer | | ms | 1000 | | | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | | | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | | | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | N/A | | |
| T2 | | s | 0.4 | | | |
| T3 | | s | 1.46 | | | |
| T4 | | s | 0.4 | | | |
| T5 | | s | 1 | | | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | | |

**Table A.7.3.21.1-2: Cell specific test parameters for E-UTRAN FDD in-sync radio link monitoring test**

| Parameter | Unit | Test 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cell1 | | | | | Cell2 | Cell3 |
| | | T1 | T2 | T3 | T4 | T5 | T1-T5 | T1-T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | 10 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | 2x2 Low |
| PCFICH/PDCCH/PHICH parameters | | R.9 FDD | | | | | R.9 FDD | R.9 FDD |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.6 FDD | | | | | OP.9 FDD | OP.9 FDD |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-2. | |
| PDCCH_RA | dB | | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PBCH_RA | dB | | | | | | | |
| PBCH_RB | dB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PSS_RA | dB | -3 | | | | | | |
| SSS_RA | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| SNR Note 6,7 | dB | -1.5 | -5.2 | -13.7 | -8.6 | -1.5 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | -98 |
| Propagation condition | Hz | ETU 30 | | | | | ETU 30 | ETU 30 |

Note 1: OCNG shall be used such that the resources in cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.21.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

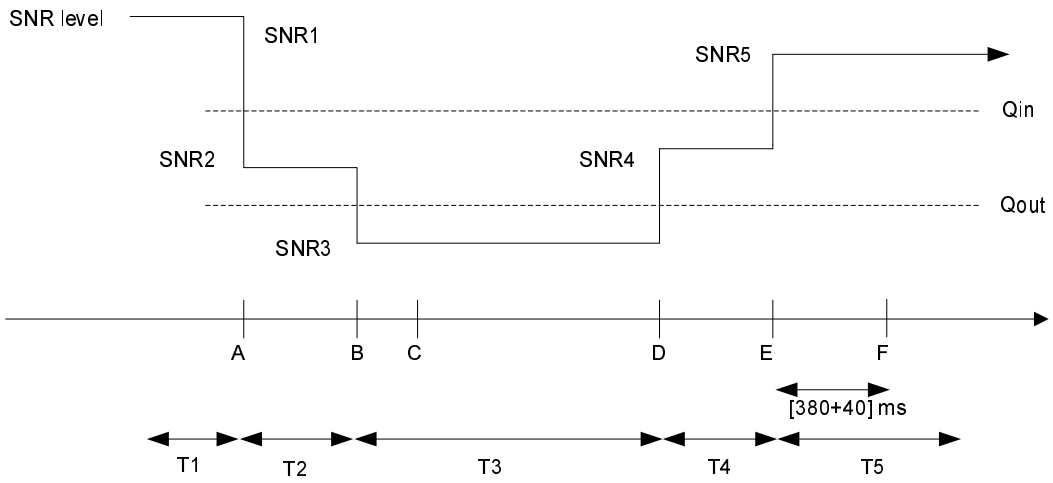


**Figure A.7.3.21.1-1 SNR variation for in-sync testing**

### A.7.3.21.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.22 E-UTRAN TDD Radio Link Monitoring Test for In-sync under Time Domain Measurement Resouce Restriction with CRS assistance information and MBSFN ABS

### A.7.3.22.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell under time domain measurement resource restriction with CRS

assistance information. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in section 7.6.

The test parameters are given in Tables A.7.3.22.1-1 and A.7.3.22.1-2 below. There are three active cells in the test: Cell 1 is the PCell and Cell 2 and 3 are the Neighbor cells. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.22.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

MBSFN ABS pattern is configured in both Cell 2 and Cell 3 in this test. The UE is configured by higher layers with a time domain measurement restriction pattern for performing PCell measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2 and Cell 3, which shall be valid during T1, T2, T3, T4 and T5 in this test. The MBSFN ABS pattern, the time domain measurement resource restriction pattern and the CRS assistance information shall be configured prior to the start of T1.

**Table A.7.3.22.1-1: General test parameters for E-UTRAN TDD in-sync radio link monitoring test**

| Parameter | Unit | Value | | | Comment |
|---|---|---|---|---|---|
| | | Test 1 | | | |
| | | Cell 1 | Cell 2 | Cell 3 | |
| PCFICH/PDCCH/PHICH parameters | | R.9 TDD | R.9 TDD | R.9 TDD | As specified in section A.3.1.2.2. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | OP.2 TDD | OP.6 TDD | OP.6 TDD | As specified in section A.3.2.2. |
| Active cell | | PCell | Neighbor Cell | Neighbor Cell | Cell 1, Cell 2 and Cell 3 are on E-UTRA RF channel number 1 |
| CP length | | Normal | Normal | Normal | |
| E-UTRA RF Channel Number | | 1 | 1 | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | 2x2 Low | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Neighbor Cell ABS configuration | | N/A | MBSFN ABS | | As defined in Table A.3.4.2.2-1 |
| ABS Pattern | | N/A | '00001000000000100000' | '00001000000000100000' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2 and Cell 3 The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod 20 = 0, where x is the size of the bit string (20) divided by 10. MBSFN subframes are configured in the ABS subframes. |
| Time domain measurement resource restriction pattern | | '00001000000000100000' | N/A | N/A | Time domain measurement resource restriction pattern for serving cell measurement signalled to the UE in message measSubframePatternPCell-r10 as defined in TS 36.331, clause 6.3.2. |

| | | | | | | |
|---|---|---|---|---|---|---|
| CRS assistance information | physCellId | | N/A | see PCI conditions below | see PCI conditions below | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation fourFrames = '01000010000010000010000000' |
| | antennaPorts Count | | | an2 | an2 | |
| | mbsfn-SubframeConfigList | | | fourFrames = '01000010000010000010000000' | fourFrames = '01000010000010000010000000' | |
| Time offset from Cell 1 | | us | 0 | 3 | 2 | |
| Frequency offset | | Hz | 0 | 300 | -100 | |
| Physical Cell ID | | | $PCI_{cell1}$ | ($PCI_{cell1}$-$PCI_{cell2}$) mod3 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | ($PCI_{cell1}$-$PCI_{cell3}$) mod3 != 0 | Cell PCIs are selected so that all conditions are met |
| In sync transmission parameters (Note 1) | DCI format | | 1C | 1C | 1C | As defined in section 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | 4 | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | | -3 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | | 1 | | | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | 1A | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | 2 | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | 8 | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | -3 | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.2-2. | | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | | | |
| DRX | | | OFF | OFF | OFF | |
| Layer 3 filtering | | | Enabled | Disable | Disable | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | N/A | | T310 is enabled |
| T311 timer | | ms | 1000 | | | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | | | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | | | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | N/A | | |
| T2 | | s | 0.4 | | | |
| T3 | | s | 1.46 | | | |
| T4 | | s | 0.4 | | | |
| T5 | | s | 1 | | | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | | |

**Table A.7.3.22.1-2: Cell specific test parameters for E-UTRAN TDD in-sync radio link monitoring test**

| Parameter | Unit | Test 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Cell1 | | | | | Cell2 | Cell3 |
| | | T1 | T2 | T3 | T4 | T5 | T1-T5 | T1-T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | | | | | 10 | 10 |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | | | 2x2 Low | 2x2 Low |
| Special subframe configuration Note 1 | | 6 | | | | | 6 | 6 |
| Uplink-downlink configuration Note 2 | | 1 | | | | | 1 | 1 |
| PCFICH/PDCCH/PHICH parameters | | R.9 TDD | | | | | R.9 TDD | R.9 TDD |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | | OP.6 TDD | OP.6 TDD |
| $\rho_A$, $\rho_B$ | | -3 | | | | | -3 | -3 |
| PCFICH_RB | dB | 1 | | | | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.2-1. | |
| PDCCH_RA | dB | -3 | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PBCH_RA | dB | | | | | | | |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 3 | dB | | | | | | | |
| OCNG_RB Note 3 | dB | | | | | | | |
| SNR Note 8,9 | dB | -1.5 | -5.2 | -13.7 | -8.6 | -1.5 | 4 | 2 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | | -98 | -98 |
| Propagation condition | Hz | ETU 30 | | | | | ETU 30 | ETU 30 |

Note 1: For the special subframe configuration see table 4.2-1 in 3GPP TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in 3GPP TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 of active cell is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.22.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

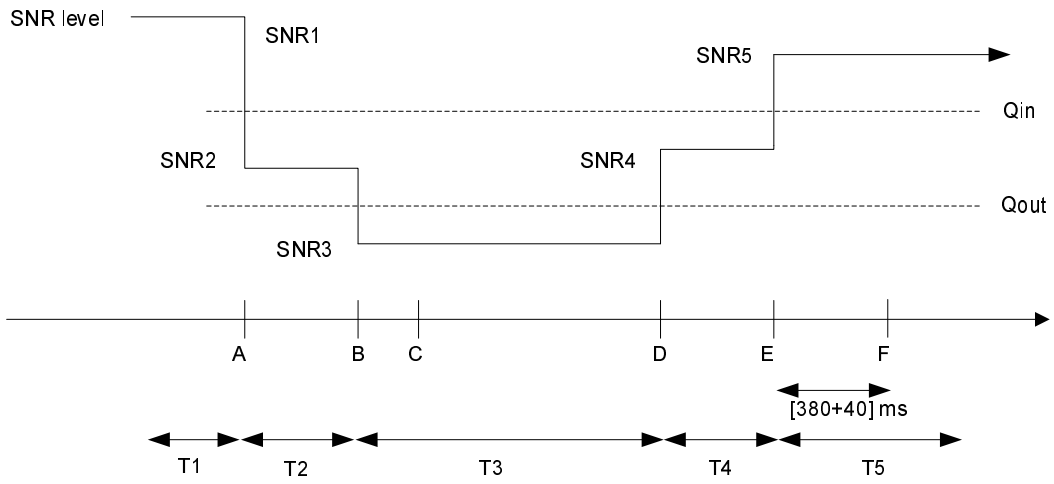


**Figure A.7.3.22.1-1 SNR variation for in-sync testing**

### A.7.3.22.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.23 E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync for 5MHz Bandwidth

### A.7.3.23.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.7.3.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.7.3.23.1-1 and A.7.3.23.1-2 will replace the values of corresponding parameters in Test 4 in Tables A.7.3.1.1-1 and A.7.3.1.1-2. Only Test 4 is defined for the 5MHz bandwidth.

**Table A.7.3.23.1-1: General test parameters for E-UTRAN FDD out-of-sync testing under 5MHz Bandwidth**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| | | | Test 4 | |
| PCFICH/PDCCH/PHICH parameters | | | R.12 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| OCNG parameters | | | OP.16 FDD | As specified in clause A.3.2.1.16. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 5 | |
| Out of sync transmission parameters (Note 1) | Number of Control OFDM Symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: See Table A.7.3.1.1-1 for other general test parameters.<br>Note 3: This test is according to the principle defined in section A.3.7.2. | | | | |

**Table A.7.3.23.1-2: Cell specific test parameters for E-UTRAN FDD for out-of-sync radio link monitoring test #4 under 5MHz Bandwidth**

| Parameter | Unit | Test 4 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | |
| OCNG Pattern defined in A.3.2.1.16 (FDD) | | OP.16 FDD | | |
| SNR Note 1,2 | dB | -2.3 | -5.7 | -12.2 |
| Note 1: See Table A.7.3.1.1-2 for other cell specific test parameters.<br>Note 2: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section A.3.8.1. | | | | |

### A.7.3.23.2 Test Requirements

The requirements defined in section A.7.3.1.2 shall apply to this test case.

## A.7.3.24 E-UTRAN FDD Radio Link Monitoring Test for In-sync for 5MHz Bandwidth

### A.7.3.24.1 Test Purpose and Environment

The purpose of this test case is the same as for the Test 2 defined in subclause A.7.3.2. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.7.3.24.1-1 and A.7.3.24.1-2 will replace the values of corresponding parameters in Tables A.7.3.2.1-1 and A.7.3.2.1-2.

**Table A.7.3.24.1-1: General test parameters for E-UTRAN FDD in-sync testing**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.12 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 5 | |
| In sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 3 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| Out of sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| Note 1: See Table A.7.3.2.1-1 for other general test parameters.<br>Note 2: This test is performed according to the principle defined in section A.3.7.2 | | | | |

**Table A.7.3.24.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for in-sync radio link monitoring test**

| Parameter | Unit | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 5 | | | | |
| OCNG Pattern defined in A.3.2.1.16 (FDD) | | OP.16 FDD | | | | |
| SNR Note 1,2 | dB | -2.3 | -5.7 | -12.2 | -7.3 | -2.3 |
| Propagation condition | | ETU 70 Hz | | | | |
| Note 1: See Table A.7.3.2.1-2 for other general test parameters.<br>Note 2: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1. | | | | | | |

## A.7.3.24.2 Test Requirements

The requirements defined in section A.7.3.2.2 shall apply to this test case.

# A.7.3.25 E-UTRAN FDD Radio Link Monitoring Test for In-sync in DRX for 5MHz Bandwidth

## A.7.3.25.1 Test Purpose and Environment

The purpose of this test case is the same as for the Test 2 defined in subclause A.7.3.6. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.7.3.25.1-1 and A.7.3.25.1-2 will replace the values of corresponding parameters in Tables A.7.3.6.1-1 and A.7.3.6.1-2.

**Table A.7.3.25.1-1: General test parameters for E-UTRAN FDD in-sync testing**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | | R.12 FDD | As specified in clause A.3.1.2.1. None of the PDCCH are intended for the UE under test |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 5 | |
| In sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 3 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| Out of sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 3 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| Note 1: See Table A.7.3.6.1-1 for other general test parameters.<br>Note 2: This test is performed according to the principle defined in section A.3.7.2 | | | | |

**Table A.7.3.25.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for in-sync radio link monitoring test**

| Parameter | Unit | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 5 | | | | |
| OCNG Pattern defined in A.3.2.1.16 (FDD) | | OP.16 FDD | | | | |
| SNR Note 1,2 | dB | -2.3 | -5.7 | -12.2 | -7.3 | -2.3 |
| Propagation condition | | AWGN | | | | |
| Note 1: See Table A.7.3.6.1-2 for other general test parameters.<br>Note 2: The SNR values are specifed for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in section A.3.8.1. | | | | | | |

### A.7.3.25.2 Test Requirements

The requirements defined in section A.7.3.6.2 shall apply to this test case.

## A.7.3.26 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for UE Category 0

### A.7.3.26.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.26.1-1, A.7.3.26.1-2 and A.7.3.26.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.26.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

**Table A.7.3.26.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync testing for UE Category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |

| | | | |
|---|---|---|---|
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 2 | Minimum CQI reporting periodicity |
| T1 | s | 1 | |
| T2 | s | 0.4 | |
| T3 | s | 0.5 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.26.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests for UE Category 0**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | R.7 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -2.1 | -6.9 | -12.9 |
| Propagation condition | | ETU 70Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.26.1-1.

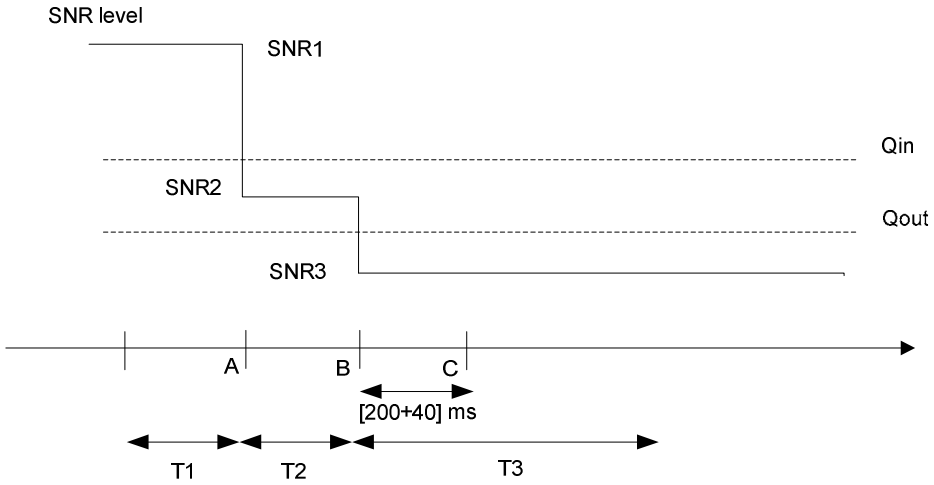


**Figure A.7.3.26.1-1: SNR variation for out-of-sync testing**

### A.7.3.26.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.27 E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync for UE Category 0

### A.7.3.27.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.27.1-1 and A.7.3.27.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.27.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms.

**Table A.7.3.27.1-1: General test parameters for E-UTRAN FD-FDD in-sync testing for UE Category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters |
| | Aggregation level | CCE | 4 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | are as specified in clause 7.11.1 and Table 7.11.1-2 respectively. |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | |
| T2 | | s | 0.4 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.27.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring test for UE Category 0**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in clause A.3.1.2.1 | | R.7 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note 1] | dB | | | | | |
| OCNG_RB[Note 1] | dB | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -2.1 | -6.9 | -12.9 | -7.1 | -2.1 |
| Propagation condition | | ETU 70Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.27.1-1.

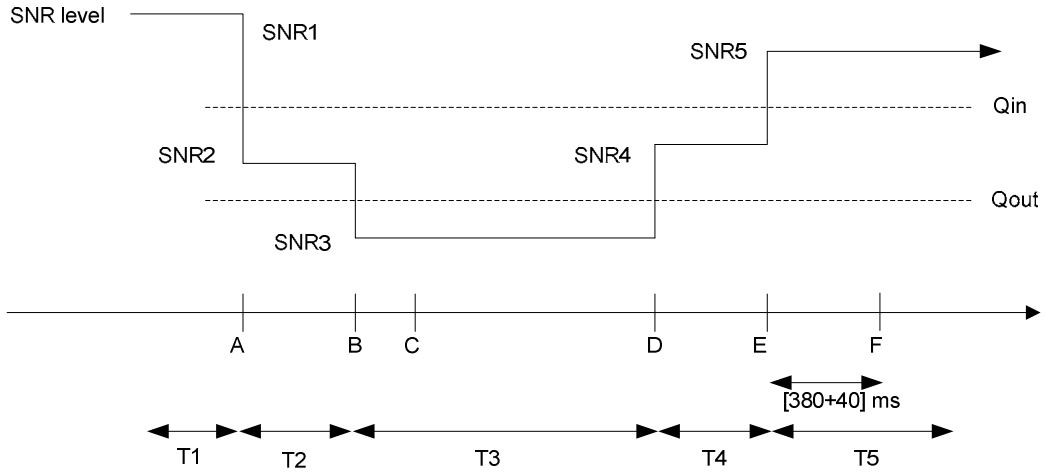


**Figure A.7.3.27.1-1: SNR variation for in-sync testing**

### A.7.3.27.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.28 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0

### A.7.3.28.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.28.1-1, A.7.3.28.1-2, A.7.3.28.1-3 and A.7.3.28.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.28.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The

UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.28.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync tests in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.28.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.28.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category 0**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PCFICH/PDCCH/PHICH parameters defined in clause A.3.1.2.1 | | R.7 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |

| | | | | |
|---|---|---|---|---|
| PHICH_RA | dB | -3 | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note1 | dB | | | |
| OCNG_RB Note1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -6.1 | -10.0 | -14.0 |
| Propagation condition | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.<br>Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.<br>Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.28.1-1. | | | | |

**Table A.7.3.28.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.28.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

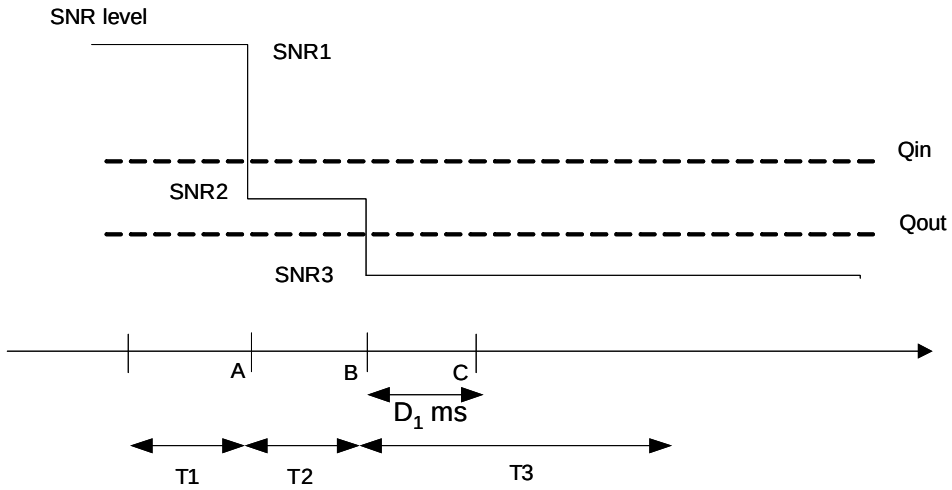


**Figure A.7.3.28.1-1: SNR variation for out-of-sync testing in DRX**

### A.7.3.28.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.29 E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category 0

### A.7.3.29.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.29.1-1, A.7.3.29.1-2, A.7.3.29.1-3 and A.7.3.29.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.29.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.29.1-1: General test parameters for E-UTRAN FD-FDD in-sync test in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |

| | | | | |
|---|---|---|---|---|
| In sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | | 1 | |
| | Ratio of PCFICH to RS EPRE | | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 40 | See Table 7.3.29.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.29.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category 0**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in clause A.3.1.2.1 | | R.7 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 8 | dB | -6.1 | -10.0 | -14.0 | -10.1 | -6.1 |

| | | |
|---|---|---|
| Propagation condition | | AWGN |
| Correlation Matrix and Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.29.1-1.

**Table A.7.3.29.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.29.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

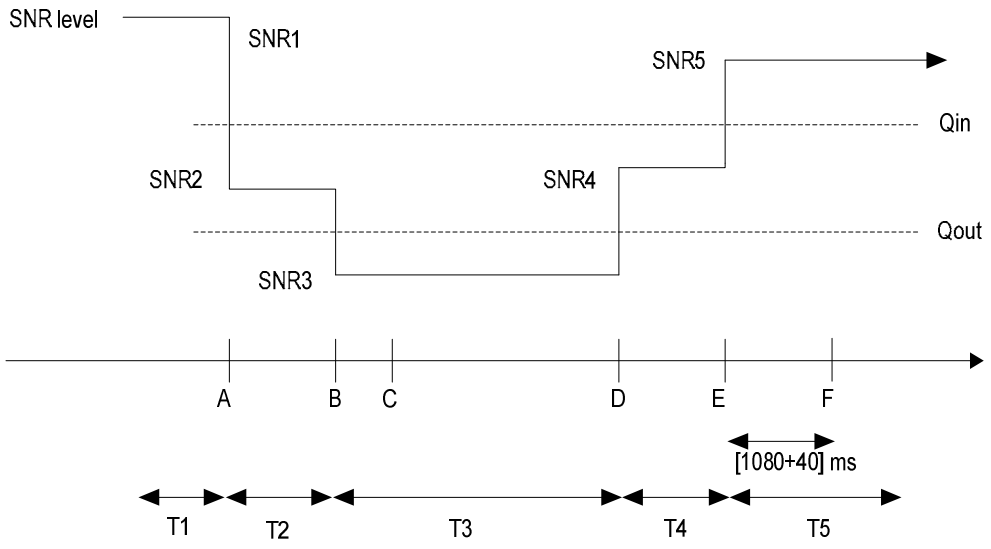


**Figure A.7.3.29.1-1: SNR variation for in-sync testing in DRX**

## A.7.3.29.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.30 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync for UE Category 0

## A.7.3.30.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.30.1-1, A.7.3.30.1-2 and A.7.3.30.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.30.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 10 ms.

**Table A.7.3.30.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync testing for UE Category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | [10] | Minimum CQI reporting periodicity |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.30.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring for UE Category 0**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PCFICH/PDCCH/PHICH parameters defined in section A.3.1.2.3 | | R.4 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -1.2 | -6.0 | -12.0 |
| Propagation condition | | ETU 70Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.30.1-1.

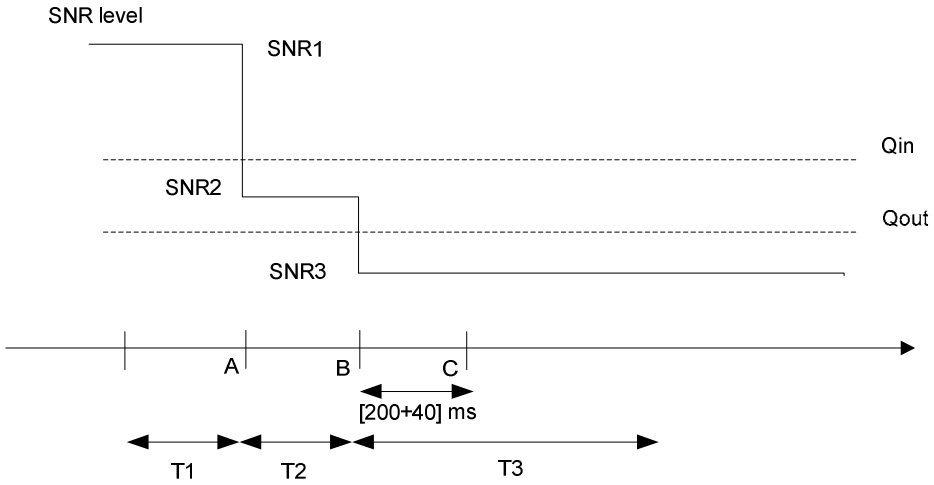


**Figure A.7.3.30.1-1: SNR variation for out-of-sync testing**

### A.7.3.30.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.31 E-UTRAN HD-FDD Radio Link Monitoring Test for In-sync for UE Category 0

### A.7.3.31.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.31.1-1 and A.7.3.31.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.31.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 10 ms.

**Table A.7.3.31.1-1: General test parameters for E-UTRAN HD-FDD in-sync testing**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH | dB | 1 | |

| | | | | |
|---|---|---|---|---|
| | to RS EPRE | | | 7.11.1-2 respectively. |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | [10] | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | |
| T2 | | s | 0.4 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.31.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring test for UE category 0**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in clause A.3.1.2.3 | | R.4 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note 1] | dB | | | | | |
| OCNG_RB[Note 1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR [Note 6] | dB | -1.2 | -6.0 | -12.0 | -6.2 | -1.2 |
| Propagation condition | | ETU 70Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 low | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 3: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 4: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 5: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 6: | The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.31.1-1. |

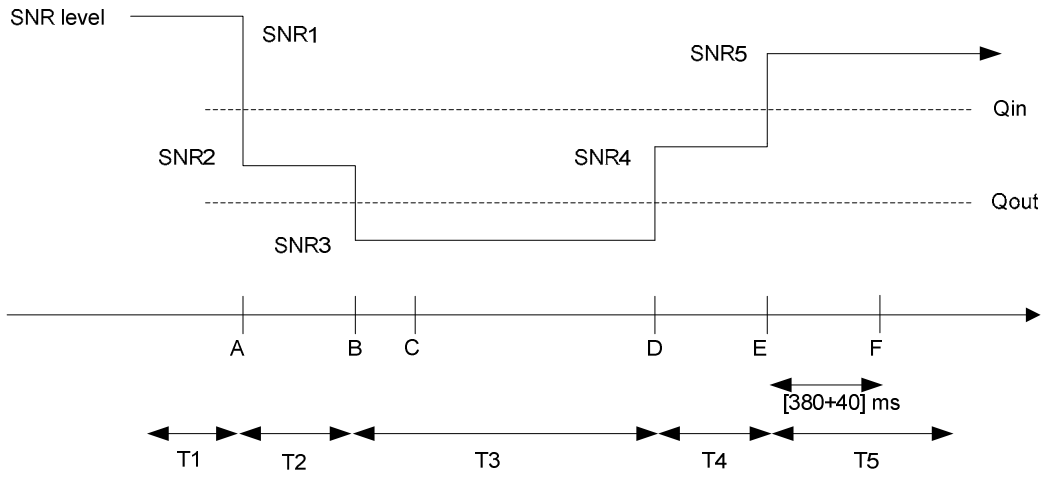


**Figure A.7.3.31.1-1: SNR variation for in-sync testing**

### A.7.3.31.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.32 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0

### A.7.3.32.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.11.

**The test parameters are given in Tables A.7.3.32.1-1, A.7.3.32.1-2, A.7.3.32.1-3 and A.7.3.32.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.32.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 5ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.**

**Table A.7.3.32.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync tests in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.32.1-3 |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 5 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.32.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category 0**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PCFICH/PDCCH/PHICH parameters specified in clause A.3.1.2.3 | | R.4 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |

| | | | | |
|---|---|---|---|---|
| SNR Note 6 | dB | -5.4 | -9.5 | -13.5 |
| Propagation condition | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.32.1-1.

**Table A.7.3.32.1-3: DRX-Configuration for E-UTRAN HD-FDD out-of-sync test for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf5 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.32.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

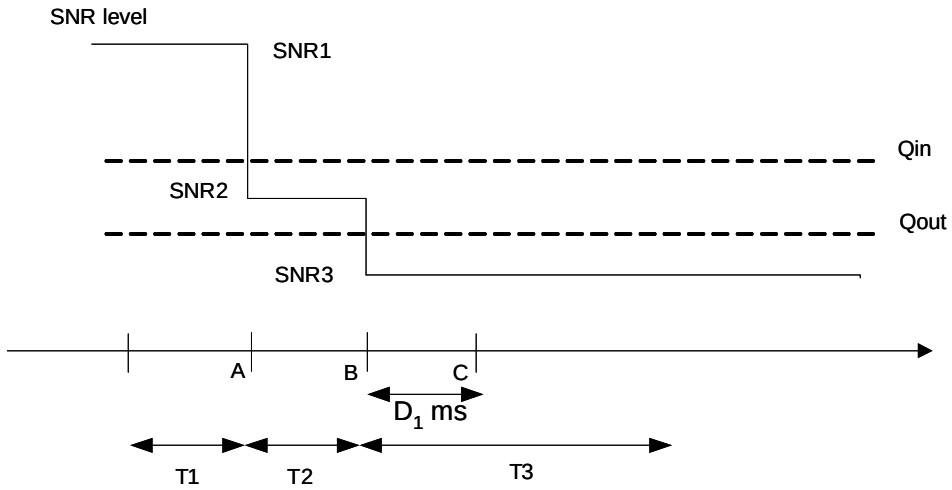


**Figure A.7.3.32.1-1: SNR variation for out-of-sync testing in DRX**

## A.7.3.32.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.33 E-UTRAN HD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category 0

## A.7.3.33.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.33.1-1, A.7.3.33.1-2, A.7.3.33.1-3 and A.7.3.33.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.33.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.33.1-1: General test parameters for E-UTRAN HD-FDD in-sync test in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause7.11.1 and Table 7.11.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 40 | See Table A.7.3.33.1-3 |

| | | | |
|---|---|---|---|
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 5 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.33.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category 0**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| PCFICH/PDCCH/PHICH parameters specified in clause A.3.1.2.3 | | R.4 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.2 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note1] | dB | | | | | |
| OCNG_RB[Note1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR [Note 6] | dB | -5.4 | -9.5 | -13.5 | -9.4 | -5.4 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.33.1-1.

**Table A.7.3.33.1-3: DRX-Configuration for E-UTRAN HD-FDD out-of-sync test for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf5 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |

| | | |
|---|---|---|
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.33.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

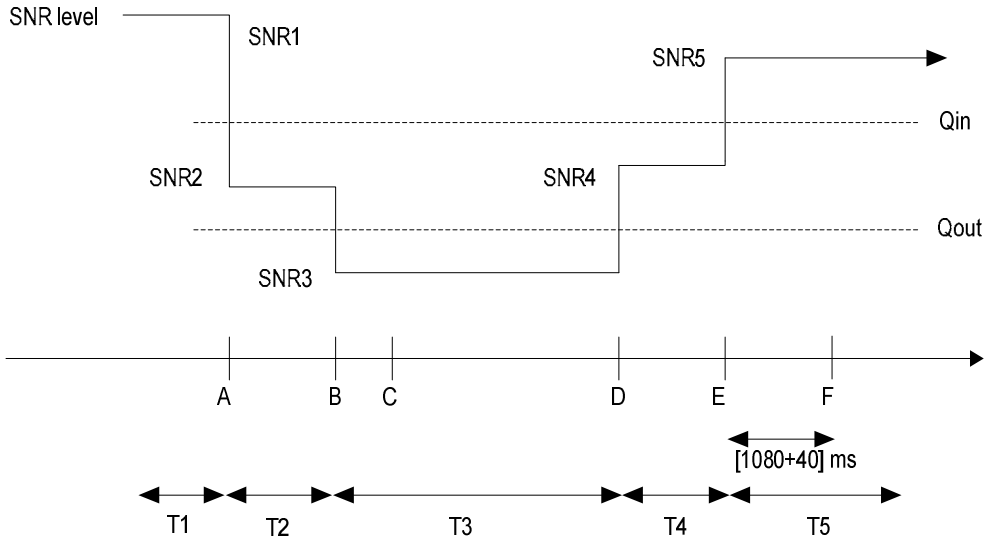


**Figure A.7.3.33.1-1: SNR variation for in-sync testing in DRX**

### A.7.3.33.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.34 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for UE Category 0

### A.7.3.34.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.34.1-1, A.7.3.34.1-2 and A.7.3.34.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.34.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

**Table A.7.3.34.1-1: General test parameters for E-UTRAN TDD out-of-sync testing for UE Category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 1 | |
| T2 | | s | 0.4 | |
| T3 | | s | 0.5 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.34.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring for UE Category 0**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| PCFICH/PDCCH/PHICH parameters defined in section A.3.1.2.2 | | R.7 TDD | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | | | |

| | | | | |
|---|---|---|---|---|
| PBCH_RB | dB | -3 | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 2 | dB | | | |
| OCNG_RB Note 2 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 7 | dB | -1.6 | -5.9 | -11.9 |
| Propagation condition | | ETU 70Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.34.1-1.

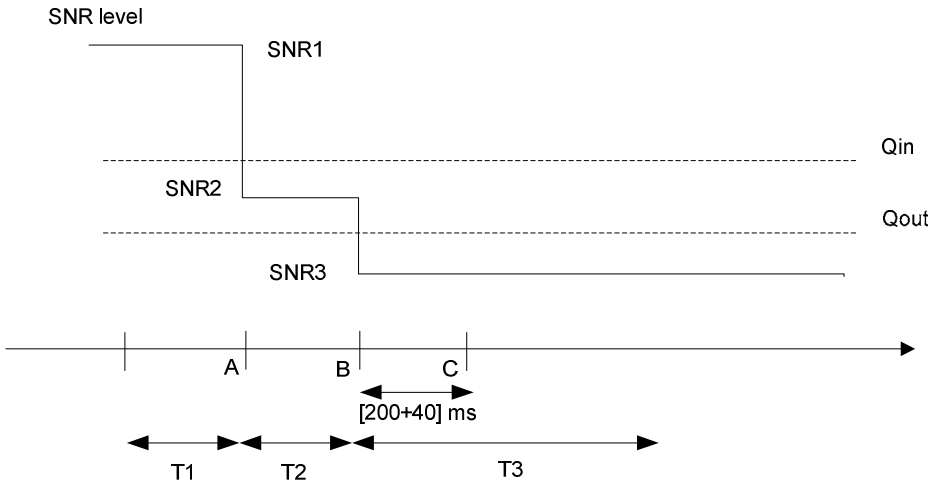


**Figure A.7.3.34.1-1: SNR variation for out-of-sync testing**

## A.7.3.34.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (240 ms after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.35 E-UTRAN TDD Radio Link Monitoring Test for In-sync for UE category 0

## A.7.3.35.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.35.1-1 and A.7.3.35.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.35.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

**Table A.7.3.35.1-1: General test parameters for E-UTRAN TDD in-sync testing**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| | | | Test 1 | |
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 0.5 | |
| T2 | | s | 0.4 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 1 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.35.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring test**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in section A.3.1.2.2 | | R.7 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 2 | dB | | | | | |
| OCNG_RB Note 2 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 7 | dB | -1.6 | -5.9 | -11.9 | -6.6 | -1.6 |
| Propagation condition | | ETU 70Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 low | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.35.1-1.

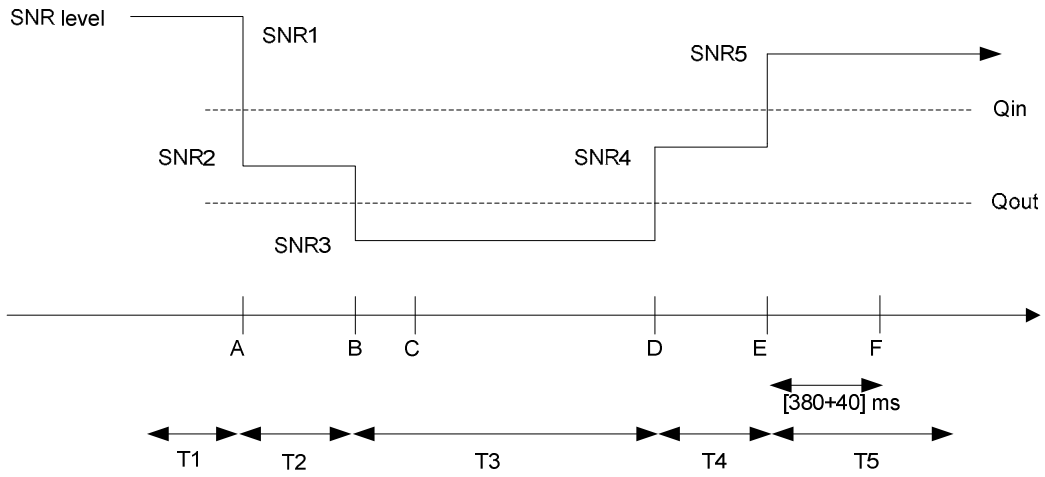


**Figure A.7.3.35.1-1: SNR variation for in-sync testing**

### A.7.3.35.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (420 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.36 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category 0

### A.7.3.36.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.36.1-1, A.7.3.36.1-2, A.7.3.36.1-3 and A.7.3.36.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.36.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.36.1-1: General test parameters for E-UTRAN TDD out-of-sync test in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 10 | |
| CP length | | | Normal | |
| | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |

| | | | | |
|---|---|---|---|---|
| Out of sync transmission parameters (Note 1) | Number of Control OFDM symbols | | 2 | Out of sync threshold Qout and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.36.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.36.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring test in DRX for UE category 0**

| Parameter | Unit | Test 2 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| PCFICH/PDCCH/PHICH parameters defined in section A.3.1.2.2 | | R.7 TDD | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PCFICH_RB | dB | 1 | | |
| PDCCH_RA | dB | 4 | | |
| PDCCH_RB | dB | 4 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note2 | dB | | | |
| OCNG_RB Note2 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 7 | dB | -5.6 | -9.6 | -13.6 |
| Propagation condition | | AWGN | | |

| | | |
|---|---|---|
| Correlation Matrix and Antenna Configuration | | 2x1 |
| Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.<br>Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.<br>Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.<br>Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.<br>Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.36.1-1. | | |

**Table A.7.3.36.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync test for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.36.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

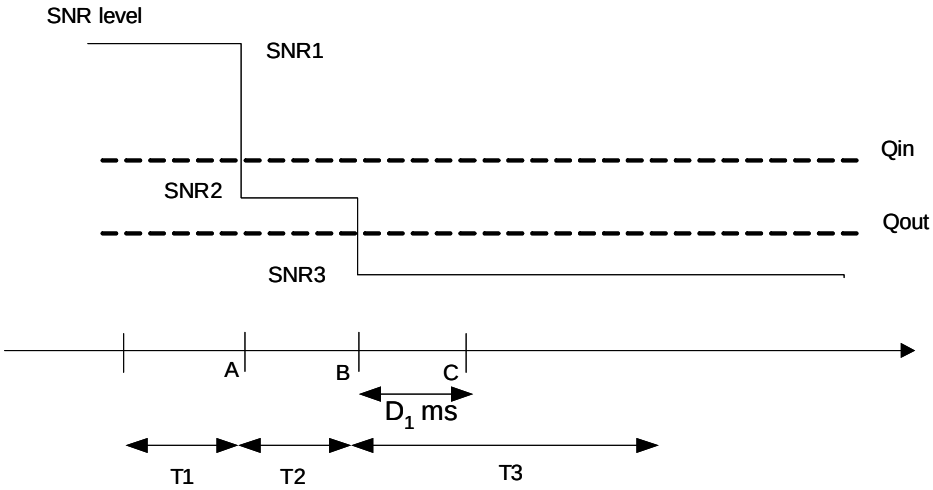


**Figure A.7.3.36.1-1: SNR variation for out-of-sync testing in DRX**

## A.7.3.36.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.37 E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for UE category 0

## A.7.3.37.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category 0 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.11.

The test parameters are given in Tables A.7.3.37.1-1, A.7.3.37.1-2, A.7.3.37.1-3 and A.7.3.37.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.37.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.37.1-1: General test parameters for E-UTRAN TDD in-sync test in DRX for UE category 0**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.11.1 and Table 7.11.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle | | ms | 40 | See Table A.7.3.37.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |

| | | | |
|---|---|---|---|
| CQI reporting periodicity | ms | 1 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.37.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category 0**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in section A.3.1.2.2 | | R.7 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.2 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| PCFICH_RB | dB | 1 | | | | |
| PDCCH_RA | dB | 1 | | | | |
| PDCCH_RB | dB | 1 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note2 | dB | | | | | |
| OCNG_RB Note2 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 7 | dB | -5.6 | -9.6 | -13.6 | -9.6 | -5.6 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.37.1-1.

**Table A.7.3.37.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync test for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |

| | | |
|---|---|---|
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.37.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

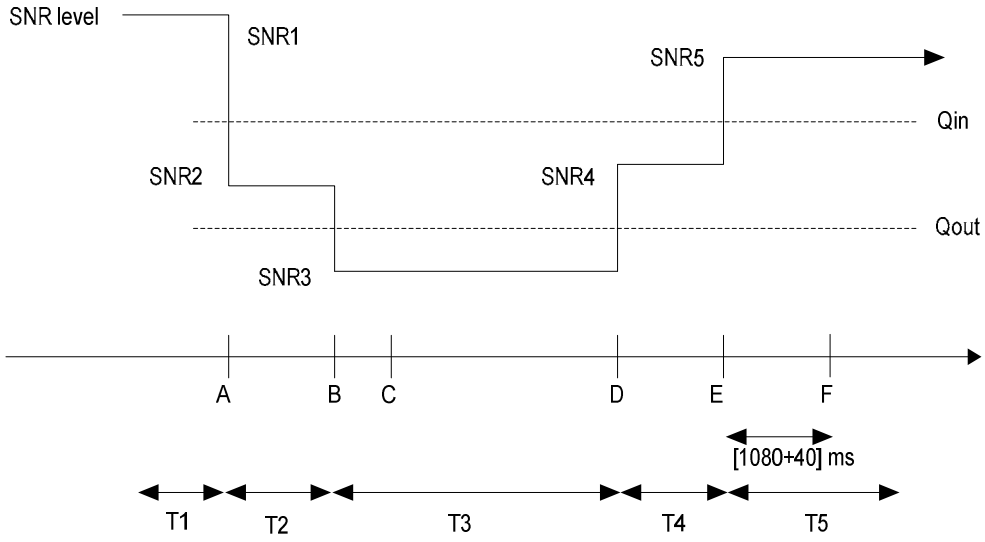


**Figure A.7.3.37.1-1: SNR variation for in-sync testing in DRX**

### A.7.3.37.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.38 E-UTRAN FDD-FDD DC Radio Link Monitoring Test for Out-of-sync in DRX in synchronous DC

### A.7.3.38.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.38.1-1, A.7.3.38.1-2, A.7.3.38.1-3, and A.7.3.38.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of three successive time periods with time duration of T1, T2 and T3 respectively. Figure A.7.3.38.1-1 shows the variation of the downlink SNR in the PCell and PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e.

UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.38.1-1: General test parameters for E-UTRAN FDD out-of-sync tests in DRX in synchronous dual connectivity**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1<br>Cell 2 | Cell 1 is PCell on E-UTRA RF channel number 1, and cell 2 is PSCell on E-UTRA RF channel number 2 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1, 2 | Two E-UTRA FDD carrier frequencies are used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 5, 10, 20 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 5MHz: 3<br>10MHz: 2<br>20MHz: 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle on cell 1 | | ms | 640 | See Table A.7.3.38.1-3 |
| DRX cycle on cell 2 | | ms | 40 | See Table A.7.3.38.1-3 |
| Timing offset between cell 1 and cell 2 | | μs | 33 | For synchronous dual connectivity |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1; N313 = 1; N314 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 0 | T313 is disabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.8 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.38.1-2: Cell specific test parameters for E-UTRAN FDD out-of-sync radio link monitoring in DRX in synchronous dual connectivity**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5, 10, 20 | | | 5, 10, 20 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| PCFICH/PDCCH/PHICH parameters<br>None of the PDCCH are intended for the UE under test | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | |
| OCNG Pattern | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| ρA, ρB | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | 1 | | |
| PDCCH_RA | dB | 1 | | | 1 | | |
| PDCCH_RB | dB | 1 | | | 1 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note1 | dB | | | | | | |
| OCNG_RB Note1 | dB | | | | | | |
| SNR Note 6,7 (5MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -2.3 | -5.7 | -12.2 |
| SNR Note 6,7 (10MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -2.3 | -6.2 | -12.2 |
| SNR Note 6,7 (20MHz bandwidth) | dB | -2.9 | -2.9 | -2.9 | -2.9 | -6.8 | -12.8 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |
| Time offset to cell1 | μs | - | | | 33 | | |

Note 1: OCNG shall be used such that the resources in cell 1 and cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, and T3 are denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.38.1-1.
Note 7: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.38.1-3: DRX-Configuration for E-UTRAN FDD out-of-sync tests in synchronous dual connectivity**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | Sf640 | Sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.38.1-4: TimeAlignmentTimer -Configuration for E-UTRAN FDD out-of-sync testing in synchronous dual connectivity**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

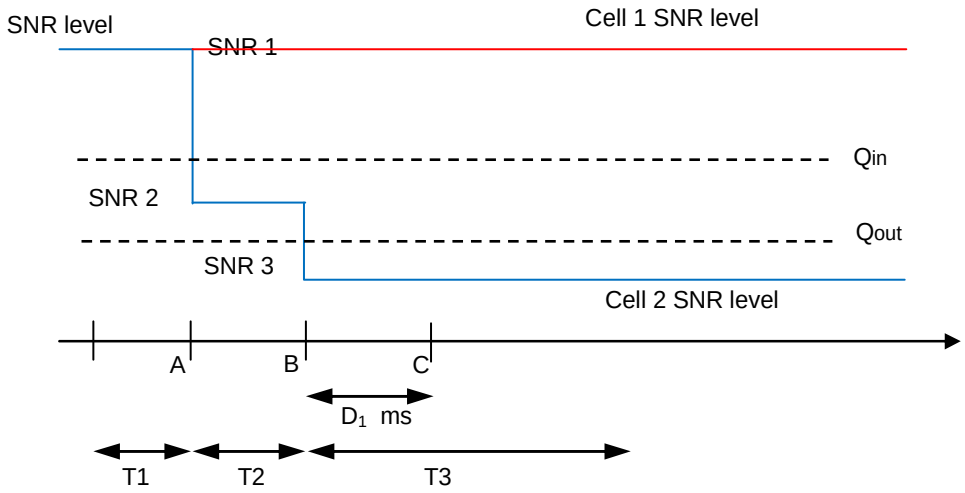


**Figure A.7.3.38.1-1 SNR variation for out-of-sync testing in DRX**

### A.7.3.38.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CQI transmission on Cell1.

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe on Cell2.

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 900 ms after the start of time duration T3) on PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.39 E-UTRAN FDD-FDD DC Radio Link Monitoring Test for Out-of-sync in DRX in asynchronous DC

### A.7.3.39.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in asynchronous dual connectivity. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in section 7.6.

The test parameters are given in Tables A.7.3.39.1-1, A.7.3.39.1-2, A.7.3.39.1-3 and A.7.3.39.1-4. There are two cells in the test. Cell 1 is PCell in MCG and cell 2 is PSCell in SCG. Before the test starts the UE is connected to cell 1 on radio channel 1 and to cell 2 on radio channel 2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. The downlink SNR in cell 1 keeps constant in the test. Figure A.7.3.39.1-1 shows the variation of the downlink SNR in the cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2 in asynchronous dual connectivity. For both cells, the UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.39.1-1: General test parameters for E-UTRAN FDD out-of-sync in DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cells | | Cell 1 and cell 2 | Cell 1 (PCell) is on E-UTRA RF channel number 1 and cell 2 (PSCell) is on E-UTRA RF channel number 2 |

| | | | | |
|---|---|---|---|---|
| CP length | | | Normal | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in section 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 5MHz: 3<br>10MHz: 2<br>20MHz: 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in section 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle in cell 1 | | ms | 640 | See Table A.7.3.39.1-3 |
| DRX cycle in cell 2 | | ms | 40 | See Table A.7.3.39.1-3 |
| Layer 3 filtering | | | Enabled | *Counters:*<br>*N310 = 1; N311 = 1;*<br>*N313 = 1; N314 = 1;* |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 0 | T313 is disabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.8 | |

Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.
Note 2: The test parameters in the table apply to both cell 1 and cell 2 unless specified otherwise.
Note 3: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.6.11.

**Table A.7.3.39.1-2: Cell specific test parameters for E-UTRAN FDD for out-of-sync radio link monitoring in DRX**

| Parameter | Unit | Cell 1 (PCell) | | | Cell 2 (PSCell) | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 5, 10, 20 | | | 5, 10, 20 | | |
| PCFICH/PDCCH/PHICH parameters. None of the PDCCH are intended for the UE under test. | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | 1 | | |
| PDCCH_RA | dB | 1 | | | 1 | | |
| PDCCH_RB | dB | 1 | | | 1 | | |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | -3 | | | -3 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA Note1 | | dB | | | | | | |
| OCNG_RB Note1 | | dB | | | | | | |
| SNR Note 6,8 | 5MHz $BW_{channel}$ | dB | -2.3 | -2.3 | -2.3 | -2.3 | -5.7 | -12.2 |
| | 10MHz $BW_{channel}$ | dB | -2.3 | -2.3 | -2.3 | -2.3 | -6.2 | -12.2 |
| | 20MHz $BW_{channel}$ | dB | -2.9 | -2.9 | -2.9 | -2.9 | -6.8 | -12.8 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | | ETU 70 Hz | | | ETU 70 Hz | | |
| Receive time offset to cell1 Note 7 | | μs | - | | | 500 | | |

Note 1: OCNG shall be used such that the resources in Cell 1 and Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.39.1-1.
Note 7: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 8: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.39.1-3: DRX-Configuration for E-UTRAN FDD out-of-sync tests**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in section 6.3.2 in 3GPP TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.39.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD out-of-sync testing**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in section 6.3.2 in 3GPP TS 36.331 |
| sr-ConfigIndex | 0 | For further information see section 6.3.2 in 3GPP TS 36.331 and section10.1 in 3GPP TS 36.213. |

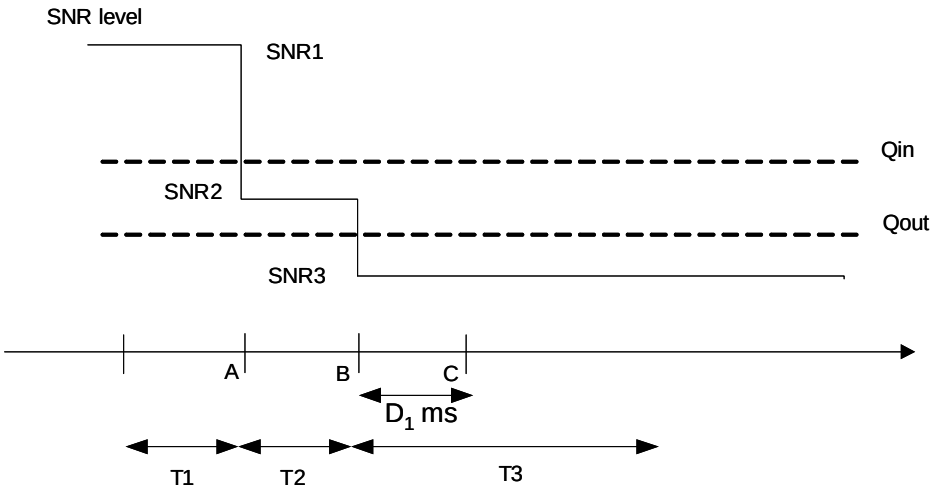


**Figure A.7.3.39.1-1 SNR variation for out-of-sync test in DRX**

### A.7.3.39.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

In the test, during time durations T1, T2 and T3, the UE shall transmit uplink signal on cell 1 at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

In the test, during the period from time point A to time point B the UE shall transmit uplink signal on cell 2 at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

In the test, the UE shall stop transmitting uplink signal on cell 2 no later than time point C (duration $D_1$ = 900 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.40 E-UTRAN TDD-TDD DC Radio Link Monitoring Test for Out-of-sync in DRX in synchronous DC

### A.7.3.40.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.40.1-1, A.7.3.40.1-2, A.7.3.40.1-3, and A.7.3.40.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of three successive time periods with time duration of T1, T2 and T3 respectively. Figure A.7.3.40.1-1 shows the variation of the downlink SNR in the PCell and PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.40.1-1: General test parameters for E-UTRAN TDD out-of-sync tests in DRX in synchronous dual connectivity**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1<br>Cell 2 | Cell 1 is PCell on E-UTRA RF channel number 1, and cell 2 is PSCell on E-UTRA RF channel number 2 |

| | | | | |
|---|---|---|---|---|
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1, 2 | Two E-UTRA TDD carrier frequencies are used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 5, 10, 20 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 5MHz: 3<br>10MHz: 2<br>20MHz: 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle on cell 1 | | ms | 640 | See Table A.7.3.40.1-3 |
| DRX cycle on cell 2 | | ms | 40 | See Table A.7.3.40.1-3 |
| Timing offset between cell 1 and cell 2 | | μs | 33 | For synchronous dual connectivity |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1; N313 = 1; N314 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 0 | T313 is disabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.8 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.40.1-2: Cell specific test parameters for E-UTRAN TDD out-of-sync radio link monitoring in DRX in synchronous dual connectivity**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5, 10, 20 | | | 5, 10, 20 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| Special subframe configuration[Note1] | | 6 | | | 6 | | |
| Uplink-downlink configuration[Note2] | | 1 | | | 1 | | |
| PCFICH/PDCCH/PHICH parameters<br>None of the PDCCH are intended for the UE under test | | 5MHz: R.12 TDD<br>10MHz: R.7 TDD<br>20MHz: R.13 TDD | | | 5MHz: R.12 TDD<br>10MHz: R.7 TDD<br>20MHz: R.13 TDD | | |
| OCNG Pattern | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| ρA, ρB | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | 1 | | |
| PDCCH_RA | dB | 1 | | | 1 | | |
| PDCCH_RB | dB | 1 | | | 1 | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note3 | dB | | | | | | |
| OCNG_RB Note3 | dB | | | | | | |
| SNR Note 8,9 (5MHz bandwidth) | dB | -1.6 | -1.6 | -1.6 | -1.6 | -5.2 | -11.9 |
| SNR Note 8,9 (10MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -2.3 | -5.9 | -11.9 |
| SNR Note 8,9 (20MHz bandwidth) | dB | -3.0 | -3.0 | -3.0 | -3.0 | -6.6 | -12.6 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |
| Time offset to cell1 | µs | - | | | 33 | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.40.1-1.
Note 9: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 is modified as specified in section A.3.8.1.

**Table A.7.3.40.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests in synchronous dual connectivity**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | Sf640 | Sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.26.1-4: TimeAlignmentTimer -Configuration for E-UTRAN FDD out-of-sync testing in synchronous dual connectivity**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

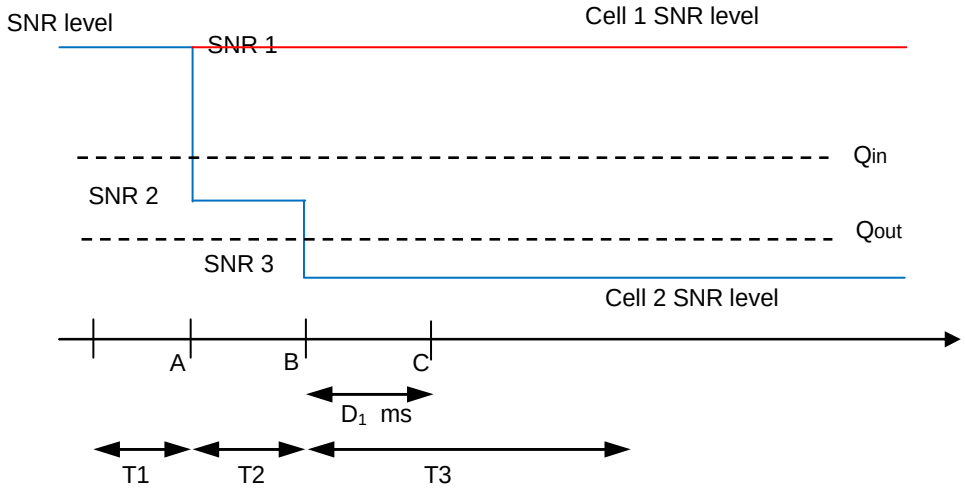


**Figure A.7.3.40.1-1 SNR variation for out-of-sync testing in DRX**

### A.7.3.40.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CQI transmission on Cell1.

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe on Cell2.

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 900 ms after the start of time duration T3) on PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.41 E-UTRAN FDD-FDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity

### A.7.3.41.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in dual connectivity. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.41.1-1, A.7.3.41.1-2, A.7.3.41.1-3 and A.7.3.41.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.41.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration for PCell and PSCell is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.41.1-1: General test parameters for E-UTRAN FDD-FDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two E-UTRA FDD carrier frequency are used. |
| Active cell | | Cell 1, Cell 2 | Cell 1 is PCell on E-UTRA RF channel number 1, and cell 2 is PSCell on E-UTRA RF channel number 2 |

| | | | | |
|---|---|---|---|---|
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-2 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle on Cell 1 | | ms | 640 | See Table A.7.3.41.1-3 |
| DRX cycle on Cell 2 | | ms | 40 | See Table A.7.3.41.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1, N313 = 1, N314 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 2000 | T313 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |
| Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.7.3.41.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Parameter | Unit | Cell 1(PCell) | Cell 2 (PSCell) | | | | |
|---|---|---|---|---|---|---|---|
| | | T1 ~ T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | 2 | | | | |
| $BW_{channel}$ | MHz | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| $\rho_A$, $\rho_B$ | | 0 | 0 | | | | |
| PCFICH_RB | dB | 4 | 4 | | | | |
| PDCCH_RA | dB | 0 | 0 | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDCCH_RB | | dB | 0 | 0 | | | | |
| PBCH_RA | | dB | 0 | 0 | | | | |
| PBCH_RB | | dB | | | | | | |
| PSS_RA | | dB | | | | | | |
| SSS_RA | | dB | | | | | | |
| PHICH_RA | | dB | | | | | | |
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA Note1 | | dB | | | | | | |
| OCNG_RB Note1 | | dB | | | | | | |
| SNR Note 6,8 | 5MHz $BW_{channel}$ | dB | -2.3 | -2.3 | -5.7 | -12.2 | -7.3 | -2.3 |
| | 10MHz $BW_{channel}$ | | -4.7 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| | 20MHz $BW_{channel}$ | | -4.7 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | | | |
| Propagation condition | | | AWGN | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 1x2 | | | | |
| Receive time offset to cell1 Note 7 | | μs | - | 33 | | | | |

Note 1: OCNG shall be used such that the resources in cell 1 and cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR of cell 2 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.41.1-1.
Note 7: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 8: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

**Table A.7.3.41.1-3: DRX-Configuration for E-UTRAN FDD-FDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in section 6.3.2 in 3GPP TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.41.1-4: TimeAlignmentTimer -Configuration for E-UTRAN FDD-FDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

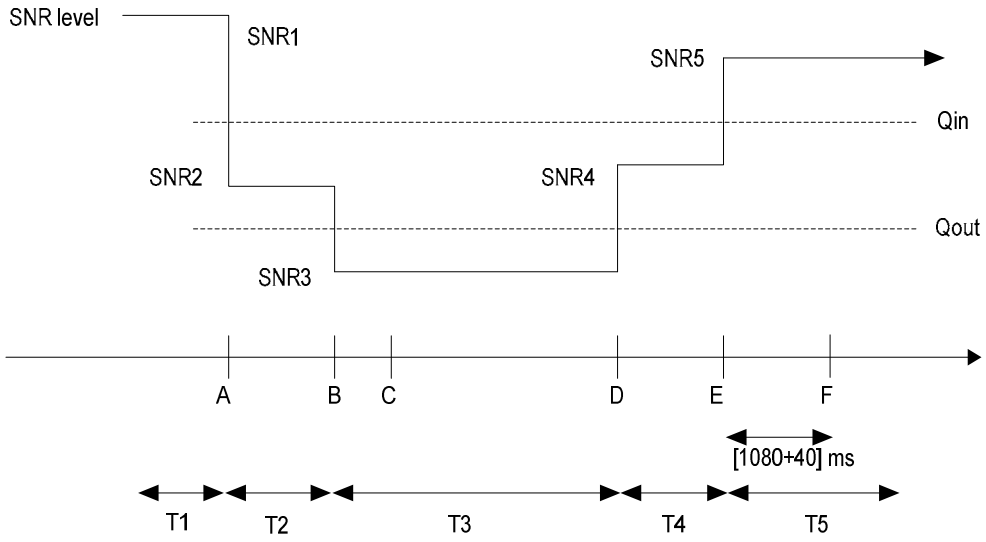


**Figure A.7.3.41.1-1 SNR variation of cell 2 (PSCell) for in-sync testing in DRX**

### A.7.3.41.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0) on PCell and PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.42 E-UTRAN FDD-FDD DC Radio Link Monitoring Test for In-sync in DRX in asynchronous DC

### A.7.3.42.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in asynchronous dual connectivity. This test will partly verify the E-UTRAN FDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.42.1-1, A.7.3.42.1-2, A.7.3.42.1-3 and A.7.3.42.1-4. There are two cells in the test. Cell 1 is PCell in MCG and cell 2 is PSCell in SCG. Before the test starts the UE is connected to cell 1 on radio channel 1 and to cell 2 on radio channel 2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. The downlink SNR in cell 1 keeps constant in the test. Figure A.7.3.42.1-1 shows the variation of the downlink SNR in cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2 in asynchronous dual connectivity. For both cell 1 and cell 2, the UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.42.1-1: General test parameters for E-UTRAN FDD in-sync test in DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cells | | Cell 1 and cell 2 | Cell 1 (PCell) is on E-UTRA RF channel number 1 and cell 2 (PSCell) is on E-UTRA RF channel number 2 |
| CP length | | Normal | |
| Antenna Configuration | | 1x2 | |

| | | | | |
|---|---|---|---|---|
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 5MHz: 3<br>10MHz: 2<br>20MHz: 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause and Table 7.6.1-2 respectively. |
| | Aggregation level | CCE | 4 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | $\rho_A$, $\rho_B$ | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle in cell 1 | | ms | 640 | See Table A.7.3.42.1-3 |
| DRX cycle in cell 2 | | ms | 40 | See Table A.7.3.42.1-3 |
| Layer 3 filtering | | | *Enabled* | *Counters:*<br>*N310 = 1; N311 = 1;*<br>*N313 = 1; N314 = 1* |
| T310 timer | | *ms* | *2000* | *T310 is enabled* |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 2000 | T313 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: The parameters in the table apply to both cell 1 and cell 2 unless defined otherwise.<br>Note 3: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.6.11. | | | | |

**Table A.7.3.42.1-2: Cell specific test parameters for E-UTRAN FDD for in-sync radio link monitoring in DRX**

| Parameter | Unit | Cell 1 (PCell) | Cell 2 (PSCell) | | | | |
|---|---|---|---|---|---|---|---|
| | | T1 ~ T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | 2 | | | | |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 5, 10, 20 | 5, 10, 20 | | | | |
| PCFICH/PDCCH/PHICH parameters.<br>None of the PDCCH are intended for the UE under test. | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Pattern | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| $\rho_A$, $\rho_B$ | | 0 | 0 | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PCFICH_RB | | dB | 4 | 4 | | | | |
| PDCCH_RA | | dB | 0 | 0 | | | | |
| PDCCH_RB | | dB | 0 | 0 | | | | |
| PBCH_RA | | dB | 0 | 0 | | | | |
| PBCH_RB | | dB | | | | | | |
| PSS_RA | | dB | | | | | | |
| SSS_RA | | dB | | | | | | |
| PHICH_RA | | dB | | | | | | |
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA Note1 | | dB | | | | | | |
| OCNG_RB Note1 | | dB | | | | | | |
| SNR Note 6,8 | 5MHz $BW_{channel}$ | dB | -2.3 | -2.3 | -5.7 | -12.2 | -7.3 | -2.3 |
| | 10MHz $BW_{channel}$ | dB | -4.7 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| | 20MHz $BW_{channel}$ | dB | -4.7 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | | | |
| Propagation condition | | | AWGN | | | | | |
| Receive time offset to cell1 Note 7 | | µs | - | 500 | | | | |

Note 1: OCNG shall be used such that the resources in cell 1 and cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR of cell 2 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.6.1-1.
Note 7: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 8: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

**Table A.7.3.42.1-3: DRX-Configuration for E-UTRAN FDD out-of-sync tests**

| Field | Cell 1 | Cell 2 | Comment |
|---|---|---|---|
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.42.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD out-of-sync testing**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

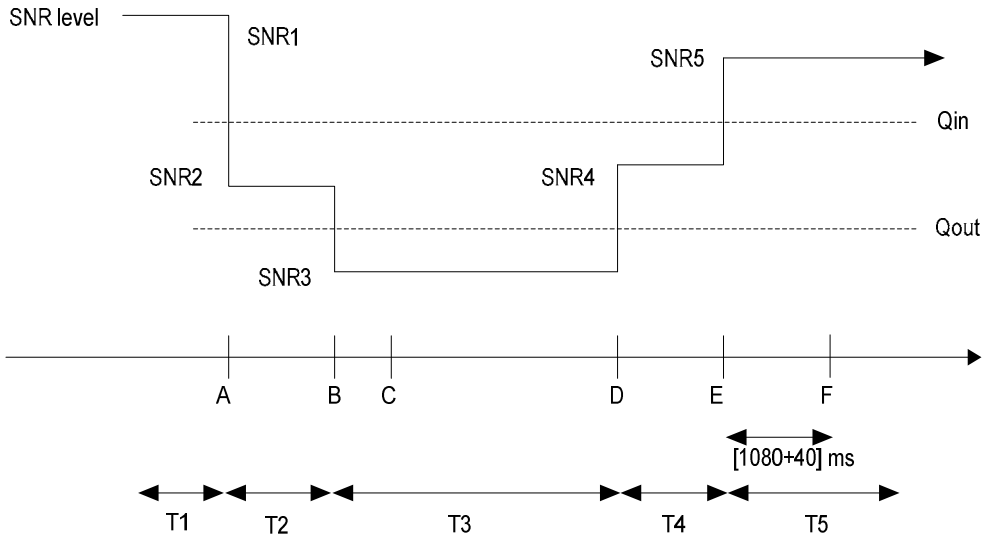


**Figure A.7.3.42.1-1 Cell 2 SNR variation for in-sync testing in DRX**

### A.7.3.42.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal on cell 2 at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.43 E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity

### A.7.3.43.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in dual connectivity. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.43.1-1, A.7.3.43.1-2, A.7.3.43.1-3 and A.7.3.43.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.43.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms. In the test, DRX configuration for PCell and PSCell is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.43.1-1: General test parameters for E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two E-UTRA TDD carrier frequency are used. |
| Active cell | | Cell 1, Cell 2 | Cell 1 is PCell on E-UTRA RF channel number 1, and cell 2 is PSCell on E-UTRA RF channel number 2 |
| CP length | | Normal | |

| | | | | |
|---|---|---|---|---|
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-2 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle on Cell 1 | | ms | 640 | See Table A.7.3.43.1-3 |
| DRX cycle on Cell 2 | | ms | 40 | See Table A.7.3.43.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1, N313 = 1, N314 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 2000 | T313 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.46 | |
| T4 | | s | 0.4 | |
| T5 | | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.7.3.43.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Parameter | Unit | Cell 1(PCell) | Cell 2 (PSCell) | | | | |
|---|---|---|---|---|---|---|---|
| | | T1 ~ T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | 2 | | | | |
| $BW_{channel}$ | MHz | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | | | | |
| Special subframe configuration[Note1] | | 6 | 6 | | | | |
| Uplink-downlink configuration[Note2] | | 1 | 1 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | |
| $\rho_A$, $\rho_B$ | | 0 | 0 | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PCFICH_RB | | dB | 4 | 4 | | | | |
| PDCCH_RA | | dB | 0 | 0 | | | | |
| PDCCH_RB | | dB | 0 | 0 | | | | |
| PBCH_RA | | dB | 0 | 0 | | | | |
| PBCH_RB | | dB | | | | | | |
| PSS_RA | | dB | | | | | | |
| SSS_RA | | dB | | | | | | |
| PHICH_RA | | dB | | | | | | |
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA Note1 | | dB | | | | | | |
| OCNG_RB Note1 | | dB | | | | | | |
| SNR Note 6,10 | 5MHz $BW_{channel}$ | dB | -5.1 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| | 10MHz $BW_{channel}$ | | -5.1 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| | 20MHz $BW_{channel}$ | | -5.1 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | | | |
| Propagation condition | | | AWGN | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 1x2 | | | | |
| Receive time offset to cell1 Note 9 | | μs | - | 33 | | | | |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.43.1-1.
Note 9: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 10: The SNR values are specifed for testing a UE which supports 2RX on the PSCell frequency. For testing of a UE which only supports 4RX on the PSCell frequency, the SNR during T3 and T4 is modified as specified in section A.3.8.1.

**Table A.7.3.43.1-3: DRX-Configuration for E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in section 6.3.2 in 3GPP TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.43.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX in synchronous dual connectivity**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

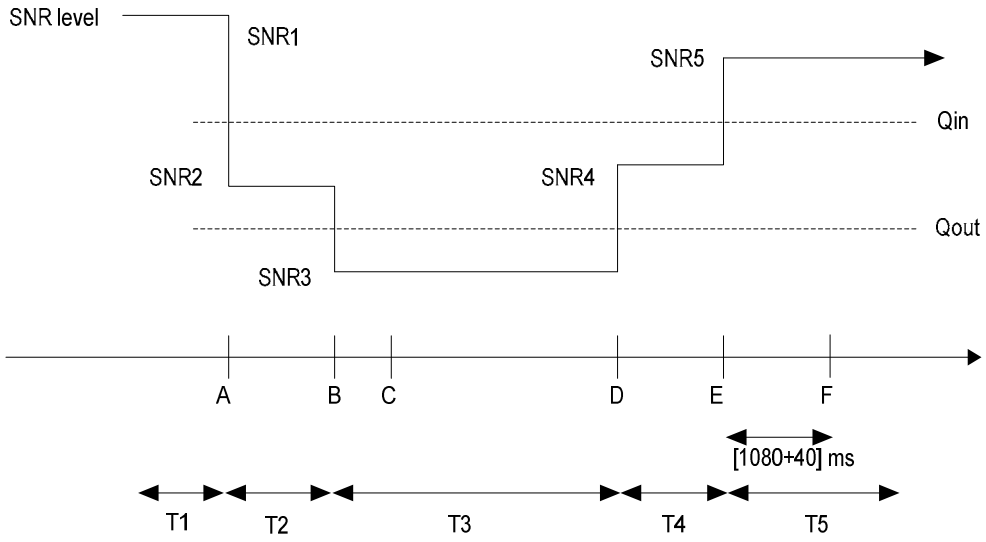


**Figure A.7.3.43.1-1 SNR variation of cell 2 (PSCell) for in-sync testing in DRX**

### A.7.3.43.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0) on PCell and PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.44 E-UTRAN TDD-FDD DC Radio Link Monitoring Test for Out-of-sync in DRX in synchronous DC with PCell in FDD

### A.7.3.44.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.44.1-1, A.7.3.44.1-2, A.7.3.44.1-3, and A.7.3.44.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of three successive time periods with time duration of T1, T2 and T3 respectively. Figure A.7.3.44.1-1 shows the variation of the downlink SNR in the PCell and PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2ms on cell 1 and 1ms on cell 2, respectively. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.44.1-1: General test parameters for E-UTRAN TDD-FDD DC out-of-sync tests in DRX in synchronous dual connectivity with PCell in FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1<br>Cell 2 | Cell 1 is PCell on E-UTRA FDD RF channel number 1, and cell 2 is PSCell on E-UTRA TDD RF channel number 2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | One E-UTRA FDD carrier frequency and one E-UTRA TDD carrier frequency are used. |
| E-UTRA Channel Bandwidth (BWchannel) | MHz | 5, 10, 20 | |

| | | | | |
|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle on cell 1 | | ms | 640 | See Table A.7.3.38.1-3 |
| DRX cycle on cell 2 | | ms | 40 | See Table A.7.3.38.1-3 |
| Timing offset between cell 1 and cell 2 | | μs | 33 | For synchronous dual connectivity |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1; N313 = 1; N314 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T313 timer | | ms | 0 | T313 is disabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| T1 | | s | 4 | |
| T2 | | s | 1.6 | |
| T3 | | s | 1.8 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.44.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC out-of-sync radio link monitoring in DRX in synchronous dual connectivity with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5, 10, 20 | | | 5, 10, 20 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| Special subframe configuration[Note7] | | - | | | 6 | | |
| Uplink-downlink configuration[Note8] | | - | | | 1 | | |
| PCFICH/PDCCH/PHICH parameters<br>None of the PDCCH are intended for the UE under test | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | | 5MHz: R.12 TDD<br>10MHz: R.7 TDD<br>20MHz: R.13 TDD | | |
| OCNG Pattern | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| ρA, ρB | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | 1 | | |
| PDCCH_RA | dB | 1 | | | 1 | | |
| PDCCH_RB | dB | 1 | | | 1 | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note1] | dB | | | | | | |
| OCNG_RB[Note1] | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SNR Note 6 (5MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -1.6 | -5.2 | -11.9 |
| SNR Note 6 (10MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -2.3 | -5.9 | -11.9 |
| SNR Note 6 (20MHz bandwidth) | dB | -2.9 | -2.9 | -2.9 | -3.0 | -6.6 | -12.6 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |
| Time offset to cell1 Note 9 | µs | - | | | 33 | | |
| CQI reporting periodicity | ms | 2 | | | 1 | | |

Note 1: OCNG shall be used such that the resources in cell 1 and cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, and T3 are denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.38.1-1.
Note 7: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 8: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 9: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.3.44.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC out-of-sync tests in synchronous dual connectivity with PCell in FDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | Sf640 | Sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.44.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-FDD DC out-of-sync testing in synchronous dual connectivity with PCell in FDD**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

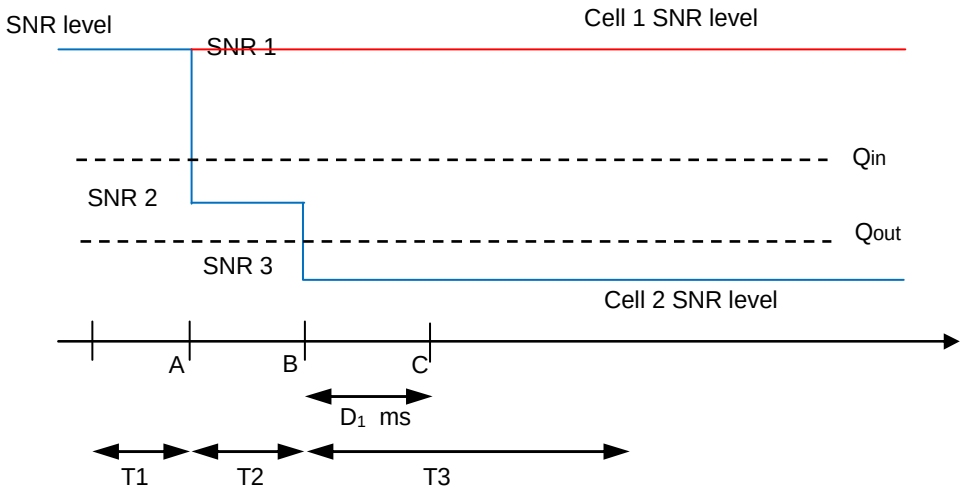


**Figure A.7.3.44.1-1 SNR variation for out-of-sync testing in DRX**

### A.7.3.44.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CQI transmission on Cell1.

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe on Cell2.

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 900 ms after the start of time duration T3) on PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.45 E-UTRAN TDD-FDD DC Radio Link Monitoring Test for Out-of-sync in DRX in synchronous DC with PCell in TDD

### A.7.3.45.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.45.1-1, A.7.3.45.1-2, A.7.3.45.1-3, and A.7.3.45.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of three successive time periods with time duration of T1, T2 and T3 respectively. Figure A.7.3.45.1-1 shows the variation of the downlink SNR in the PCell and PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1ms on cell 1 and 2ms on cell 2, respectively. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.45.1-1: General test parameters for E-UTRAN TDD-FDD DC out-of-sync tests in DRX in synchronous dual connectivity with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1<br>Cell 2 | Cell 1 is PCell on E-UTRA TDD RF channel number 1, and cell 2 is PSCell on E-UTRA FDD RF channel number 2 |
| CP length | | | Normal | |
| E-UTRA RF Channel Number | | | 1, 2 | One E-UTRA TDD carrier frequencies and one E-UTRA FDD carrier frequencies are used. |
| E-UTRA Channel Bandwidth (BWchannel) | | MHz | 5, 10, 20 | |
| Correlation Matrix and Antenna Configuration | | | 2x2 Low | Correlation Matrix and Antenna Configuration are defined in TS 36.101 [5] Annex B.2.3.2 |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | Aggregation level | CCE | 8 | |
| | ρA, ρB | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 1 | |
| | Ratio of PCFICH to RS EPRE | dB | 1 | |
| DRX cycle on cell 1 | | ms | 640 | See Table A.7.3.40.1-3 |
| DRX cycle on cell 2 | | ms | 40 | See Table A.7.3.40.1-3 |
| Timing offset between cell 1 and cell 2 | | μs | 33 | For synchronous dual connectivity |
| Layer 3 filtering | | | Enabled | Counters: |

| | | | |
|---|---|---|---|
| | | | N310 = 1; N311 = 1; N313 = 1; N314 = 1 |
| T310 timer | ms | 0 | T310 is disabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T313 timer | ms | 0 | T313 is disabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.8 | |
| Note 1: PDCCH/PCFICH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.45.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC out-of-sync radio link monitoring in DRX in synchronous dual connectivity with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5, 10, 20 | | | 5, 10, 20 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | |
| Special subframe configuration[Note1] | | 6 | | | - | | |
| Uplink-downlink configuration[Note2] | | 1 | | | - | | |
| PCFICH/PDCCH/PHICH parameters None of the PDCCH are intended for the UE under test | | 5MHz: R.12 TDD<br>10MHz: R.7 TDD<br>20MHz: R.13 TDD | | | 5MHz: R.12 FDD<br>10MHz: R.7 FDD<br>20MHz: R.13 FDD | | |
| OCNG Pattern | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| ρA, ρB | | -3 | | | -3 | | |
| PCFICH_RB | dB | 1 | | | 1 | | |
| PDCCH_RA | dB | 1 | | | 1 | | |
| PDCCH_RB | dB | 1 | | | 1 | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note3] | dB | | | | | | |
| OCNG_RB[Note3] | dB | | | | | | |
| SNR [Note 8] (5MHz bandwidth) | dB | -1.6 | -1.6 | -1.6 | -2.3 | -5.7 | -12.2 |
| SNR [Note 8] (10MHz bandwidth) | dB | -2.3 | -2.3 | -2.3 | -2.3 | -6.2 | -12.2 |
| SNR [Note 8] (20MHz bandwidth) | dB | -3.0 | -3.0 | -3.0 | -2.9 | -6.8 | -12.8 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | -98 | | |
| Propagation condition | | ETU 70 Hz | | | ETU 70 Hz | | |
| Time offset to cell1 [Note 9] | μs | - | | | 33 | | |
| CQI reporting periodicity | ms | 1 | | | 2 | | |

| | |
|---|---|
| Note 1: | For the special subframe configuration see table 4.2-1 in TS 36.211. |
| Note 2: | For the uplink-downlink configuration see table 4.2-2 in TS 36.211. |
| Note 3: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 5: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 6: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 7: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 8: | The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.40.1-1. |
| Note 9: | Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. |

**Table A.7.3.45.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC out-of-sync tests in synchronous dual connectivity with PCell in TDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | Sf640 | Sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.45.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-FDD CA out-of-sync testing in synchronous dual connectivity with PCell in TDD**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

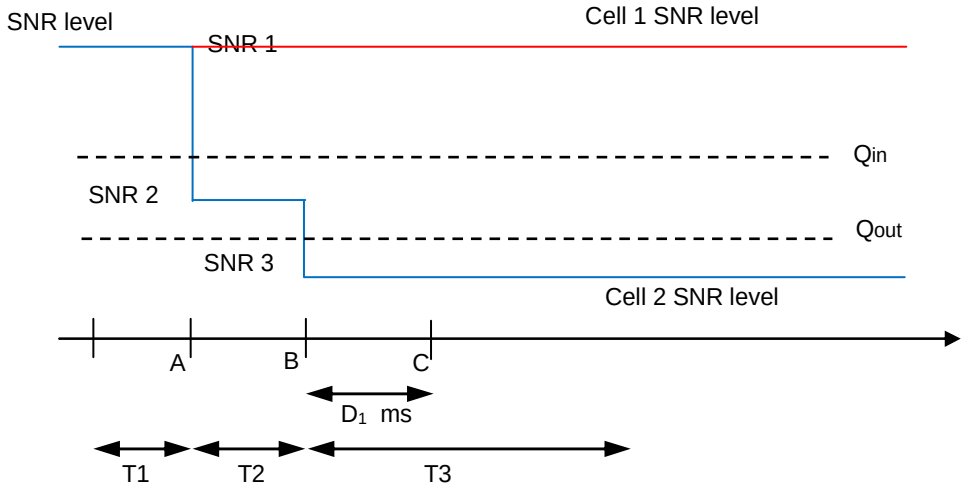


**Figure A.7.3.45.1-1 SNR variation for out-of-sync testing in DRX**

## A.7.3.45.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CQI transmission on Cell1.

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the uplink subframe on Cell2.

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 900 ms after the start of time duration T3) on PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.46 E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in FDD

## A.7.3.46.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in dual connectivity. This test will partly verify the E-UTRAN FDD and TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.46.1-1, A.7.3.46.1-2, A.7.3.46.1-3 and A.7.3.46.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.46.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms on PCell and 1ms on PSCell. In the test, DRX configuration for PCell and PSCell is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.46.1-1: General test parameters for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | One E-UTRA FDD carrier frequency and One E-UTRA TDD carrier frequency are used. |
| Active cell | | | Cell 1, Cell 2 | Cell 1 is PCell on E-UTRA FDD RF channel number 1, and cell 2 is PSCell on E-UTRA TDD RF channel number 2 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-2 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle on Cell 1 | | ms | 640 | See Table A.7.3.41.1-3 |
| DRX cycle on Cell 2 | | ms | 40 | See Table A.7.3.41.1-3 |
| Layer 3 filtering | | | Enabled | Counters: |

| | | | |
|---|---|---|---|
| | | | N310 = 1; N311 = 1, N313 = 1, N314 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T313 timer | ms | 2000 | T313 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |
| Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.3.46.1-2: Cell specific test parameters for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in FDD**

| Parameter | | Unit | Cell 1(PCell) | Cell 2 (PSCell) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 ~ T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | | 1 | 2 | | | | |
| $BW_{channel}$ | | MHz | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | | | | |
| Special subframe configuration Note1 | | | - | 6 | | | | |
| Uplink-downlink configuration Note2 | | | - | 1 | | | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 and A.3.1.2.2 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) and A.3.2.2 (TDD) | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | |
| $\rho_A$, $\rho_B$ | | | 0 | 0 | | | | |
| PCFICH_RB | | dB | 4 | 4 | | | | |
| PDCCH_RA | | dB | 0 | 0 | | | | |
| PDCCH_RB | | dB | 0 | 0 | | | | |
| PBCH_RA | | dB | 0 | 0 | | | | |
| PBCH_RB | | dB | | | | | | |
| PSS_RA | | dB | | | | | | |
| SSS_RA | | dB | | | | | | |
| PHICH_RA | | dB | | | | | | |
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA Note3 | | dB | | | | | | |
| OCNG_RB Note3 | | dB | | | | | | |
| SNR Note 8 | 5MHz $BW_{channel}$ | dB | -2.3 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| | 10MHz $BW_{channel}$ | | -4.7 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| | 20MHz $BW_{channel}$ | | -4.7 | -5.1 | -9.1 | -13.1 | -9.1 | -5.1 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | | | |
| Propagation condition | | | AWGN | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 1x2 | | | | |
| Receive time offset to cell1 Note 9 | | μs | - | 33 | | | | |
| CQI reporting periodicity | | ms | 2 | 1 | | | | |

| | |
|---|---|
| Note 1: | For the special subframe configuration see table 4.2-1 in TS 36.211. |
| Note 2: | For the uplink-downlink configuration see table 4.2-2 in TS 36.211. |
| Note 3: | OCNG shall be used such that the resources in cell 1 and cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 5: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 6: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 7: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 8: | The SNR of Cell 2 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.46.1-1. |
| Note 9: | Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. |

**Table A.7.3.46.1-3: DRX-Configuration for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in FDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in section 6.3.2 in 3GPP TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.46.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in FDD**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

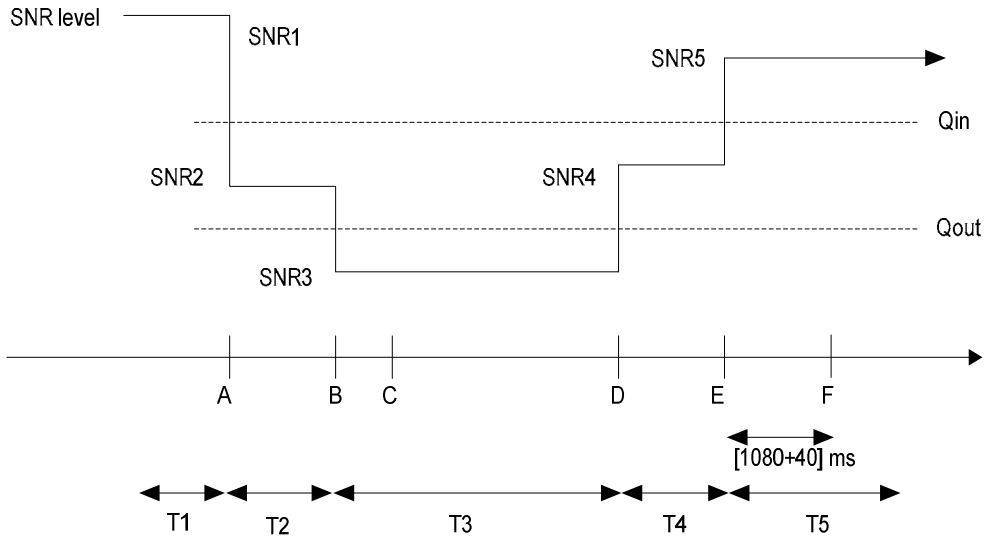


**Figure A.7.3.46.1-1 SNR variation of cell 2 (PSCell) for in-sync testing in DRX**

## A.7.3.46.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0) on PCell and PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.47 E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in TDD

## A.7.3.47.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used in dual connectivity. This test will partly verify the E-UTRAN FDD and TDD radio link monitoring requirements in clause 7.6.

The test parameters are given in Tables A.7.3.47.1-1, A.7.3.47.1-2, A.7.3.47.1-3 and A.7.3.47.1-4. There are two cells, cell 1 is PCell and cell 2 is PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.47.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1ms on PCell and 2ms on PSCell. In the test, DRX configuration for PCell and PSCell is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

**Table A.7.3.47.1-1: General test parameters for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | One E-UTRA TDD carrier frequency and One E-UTRA FDD carrier frequency are used. |
| Active cell | | | Cell 1, Cell 2 | Cell 1 is PCell on E-UTRA TDD RF channel number 1, and cell 2 is PSCell on E-UTRA FDD RF channel number 2 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 1C | As defined in clause 5.3.3.1.4 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 4 | In sync threshold $Q_{in}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-2 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | | 0 | |
| | Ratio of PCFICH to RS EPRE | | 4 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 1A | As defined in clause 5.3.3.1.3 in TS 36.212 |
| | Number of Control OFDM symbols | | 2 | For 10MHz and 20MHz channel BW |
| | Number of Control OFDM symbols | | 3 | For 5MHz channel BW |
| | Aggregation level | CCE | 8 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical PDCCH/PCFICH transmission parameters are as specified in clause 7.6.1 and Table 7.6.1-1 respectively. |
| | ρA, ρB | | 0 | |
| | Ratio of PDCCH to RS EPRE | dB | 4 | |
| | Ratio of PCFICH to RS EPRE | dB | 4 | |
| DRX cycle on Cell 1 | | ms | 640 | See Table A.7.3.43.1-3 |
| DRX cycle on Cell 2 | | ms | 40 | See Table A.7.3.43.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1, N313 = 1, N314 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |

| | | | |
|---|---|---|---|
| T313 timer | ms | 2000 | T313 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: PDCCH/PCFICH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.3.47.1-2: Cell specific test parameters for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in TDD**

| Parameter | | Unit | Cell 1(PCell) | Cell 2 (PSCell) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 ~ T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | | 1 | 2 | | | | |
| $BW_{channel}$ | | MHz | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | | | | |
| Special subframe configuration[Note1] | | | 6 | - | | | | |
| Uplink-downlink configuration[Note2] | | | 1 | - | | | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 and A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) and A.3.2.2 (TDD) | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| $\rho_A$, $\rho_B$ | | | 0 | 0 | | | | |
| PCFICH_RB | | dB | 4 | 4 | | | | |
| PDCCH_RA | | dB | 0 | 0 | | | | |
| PDCCH_RB | | dB | 0 | 0 | | | | |
| PBCH_RA | | dB | 0 | 0 | | | | |
| PBCH_RB | | dB | | | | | | |
| PSS_RA | | dB | | | | | | |
| SSS_RA | | dB | | | | | | |
| PHICH_RA | | dB | | | | | | |
| PHICH_RB | | dB | | | | | | |
| PDSCH_RA | | dB | | | | | | |
| PDSCH_RB | | dB | | | | | | |
| OCNG_RA[Note1] | | dB | | | | | | |
| OCNG_RB[Note1] | | dB | | | | | | |
| SNR [Note 6] | 5MHz $BW_{channel}$ | dB | -5.1 | -2.3 | -5.7 | -12.2 | -7.3 | -2.3 |
| | 10MHz $BW_{channel}$ | | -5.1 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| | 20MHz $BW_{channel}$ | | -5.1 | -4.7 | -9.5 | -13.5 | -8.7 | -4.7 |
| $N_{oc}$ | | dBm/15 kHz | -98 | | | | | |
| Propagation condition | | | AWGN | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | | 1x2 | 1x2 | | | | |
| Receive time offset to cell1 [Note 9] | | μs | - | 33 | | | | |
| CQI reporting periodicity | | ms | 1 | 2 | | | | |

| | |
|---|---|
| Note 1: | For the special subframe configuration see table 4.2-1 in TS 36.211. |
| Note 2: | For the uplink-downlink configuration see table 4.2-2 in TS 36.211. |
| Note 3: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 5: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 6: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 7: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 8: | The SNR of Cell 2 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.47.1-1. |
| Note 9: | Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. |

**Table A.7.3.47.1-3: DRX-Configuration for E-UTRAN TDD-FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in TDD**

| Field | Value | | Comment |
|---|---|---|---|
| | Cell 1 | Cell 2 | |
| onDurationTimer | psf2 | psf2 | As specified in section 6.3.2 in 3GPP TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf640 | sf40 | |
| shortDRX | disable | disable | |

**Table A.7.3.47.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-TDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous DC with PCell in TDD**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

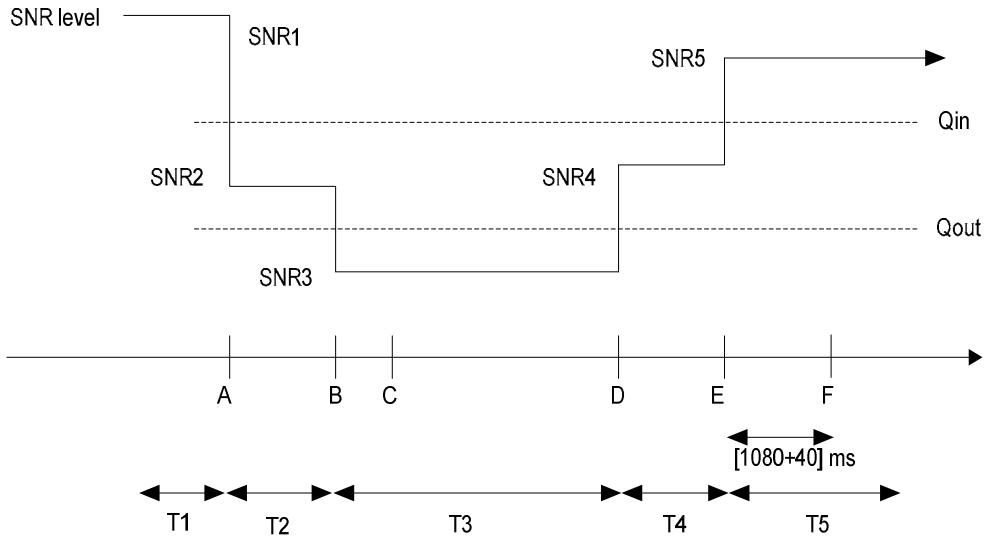


**Figure A.7.3.47.1-1 SNR variation of cell 2 (PSCell) for in-sync testing in DRX**

## A.7.3.47.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0) on PCell and PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.48 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A

## A.7.3.48.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.48.1-1 and A.7.3.48.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.48.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.48.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.48.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.48.1-1.

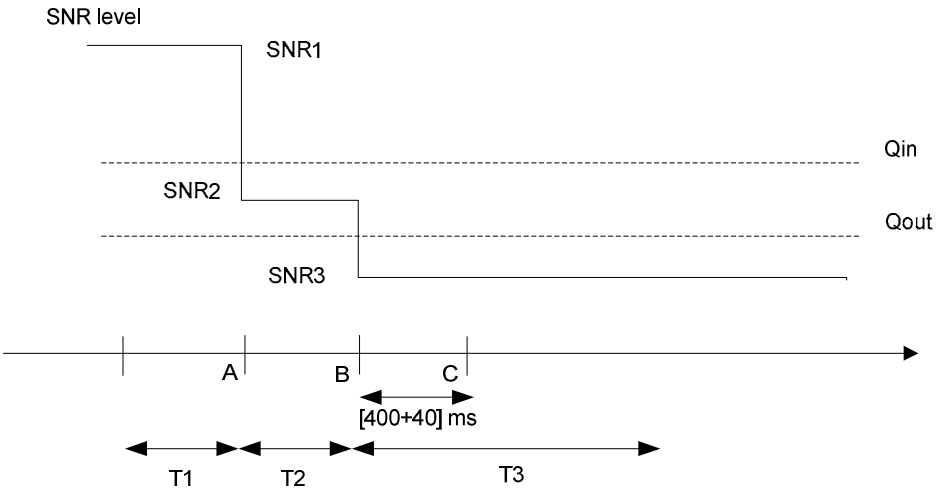


**Figure A.7.3.48.1-1: SNR variation for out-of-sync testing**

### A.7.3.48.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.49 E-UTRAN FD-FDD Radio Link Monitoring Test for In-Sync for Cat-M1 UE in CEMode A

### A.7.3.49.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.49.1-1 and A.7.3.49.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.49.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.49.1-1: General test parameters for E-UTRAN FD-FDD in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 4 | |
| | M-PDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 4 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.49.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.49.1-1.

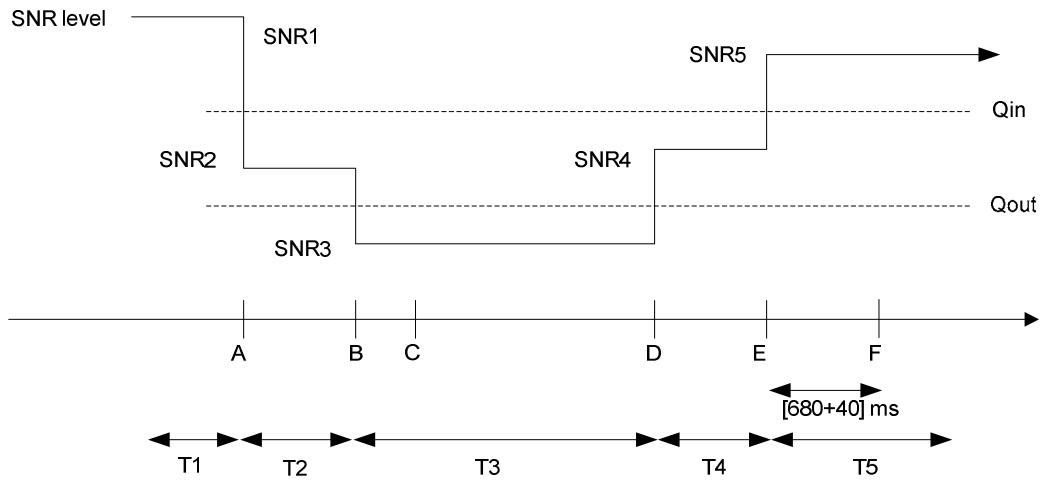


**Figure A.7.3.49.1-1: SNR variation for in-sync testing**

### A.7.3.49.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (720 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.50 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category M1 configured in CEMode A

### A.7.3.50.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category M1 UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.50.1-1, A.7.3.50.1-2, A.7.3.50.1-3 and A.7.3.50.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.50.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.50.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync tests in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out,\ Cat\ M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 16 | |
| | MPDCCH repetition level | | 4 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.50.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.50.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters defined in A.3.1.3 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR [Note 6] | dB | 0.37 | -6.98 | -14.98 |
| Propagation condition | | AWGN | | |

| | | |
|---|---|---|
| Correlation Matrix and Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.<br>Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.<br>Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.50.1-1. | | |

**Table A.7.3.50.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.50.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

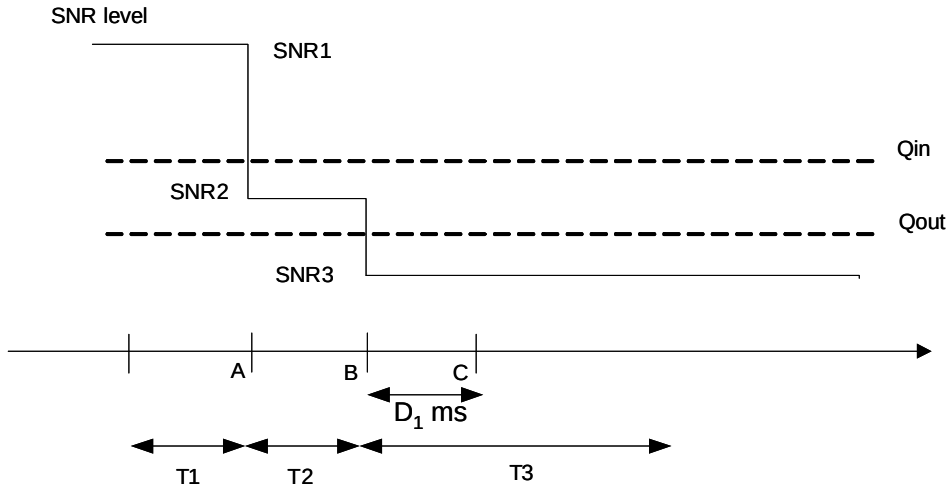


**Figure A.7.3.50.1-1: SNR variation for out-of-sync testing in DRX**

## A.7.3.50.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.51 E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category M1 configured in CEMode A

## A.7.3.51.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category M1 UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.51.1-1, A.7.3.51.1-2, A.7.3.51.1-3 and A.7.3.51.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.51.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.51.1-1: General test parameters for E-UTRAN FD-FDD in-sync test in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 8 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 24 | |
| | MPDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 40 | See Table A.7.3.51.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |

| | | | |
|---|---|---|---|
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 2 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.51.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.17 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 8 | dB | -4.58 | -10 | -18 | -10.58 | -4.58 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.51.1-1.

**Table A.7.3.51.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.51.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

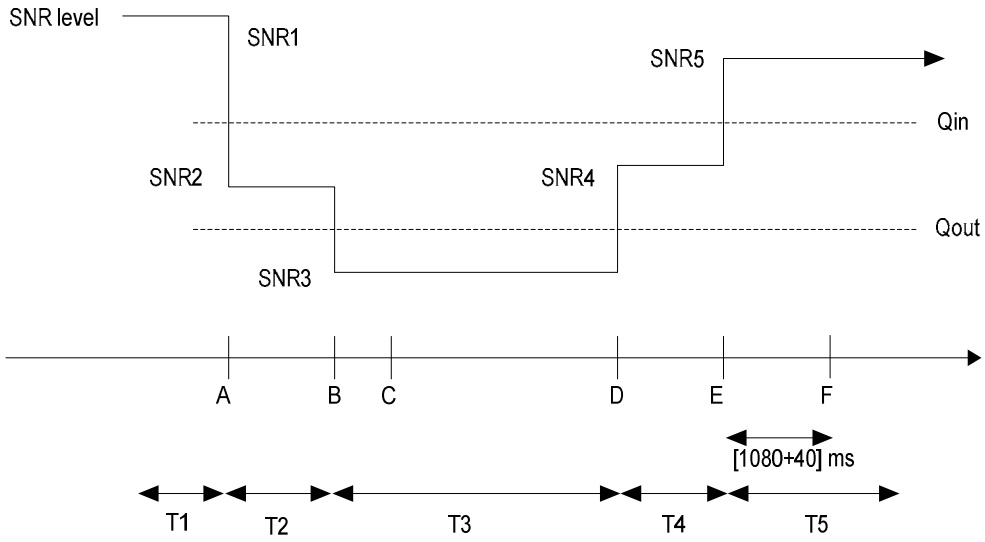


**Figure A.7.3.51.1-1: SNR variation for in-sync testing in DRX**

### A.7.3.51.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.52 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A

### A.7.3.52.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.52.1-1 and A.7.3.52.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.52.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 20 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the *RRC parameter mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.52.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH transmission parameters corresponding to the in-sync and out of sync transmission need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.52.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.7 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA[Note 1] | dB | | | |
| OCNG_RB[Note 1] | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |

| | | | | |
|---|---|---|---|---|
| SNR Note 6 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.x5.1-1.

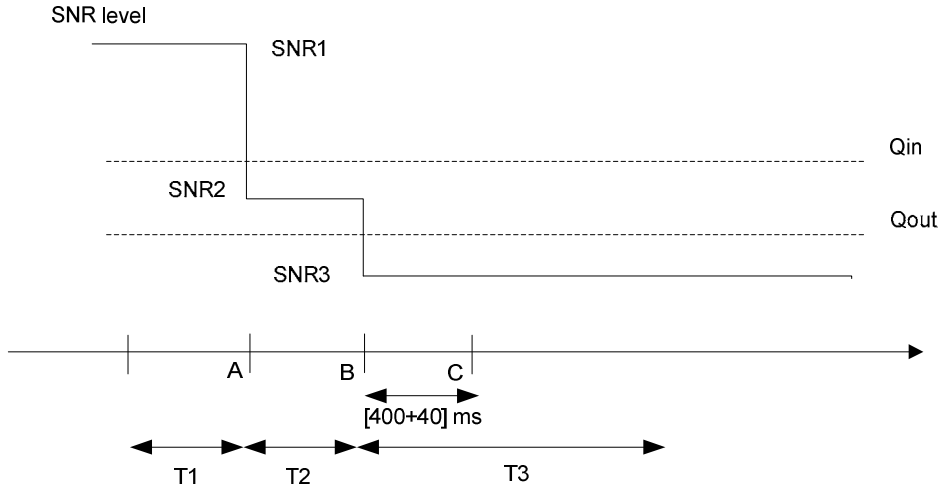


**Figure A.7.3.52.1-1: SNR variation for out-of-sync testing**

### A.7.3.52.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.53 E-UTRAN HD-FDD Radio Link Monitoring Test for In-Sync for Cat-M1 UE in CEMode A

### A.7.3.53.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.53.1-1 and A.7.3.53.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.53.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and

in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 20 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.53.1-1: General test parameters for E-UTRAN HD-FDD in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 4 | |
| | M-PDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.53.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.7 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.53.1-1.

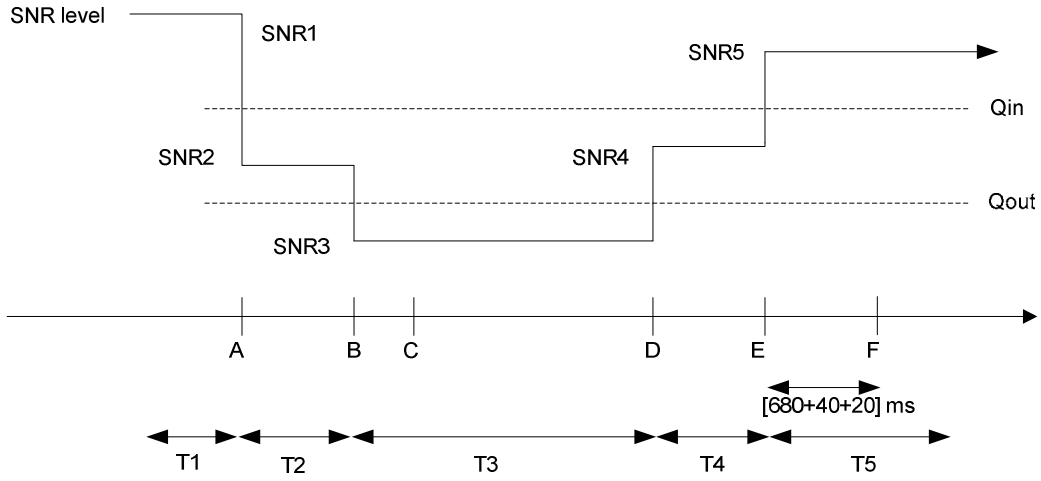


**Figure A.7.3.53.1-1: SNR variation for in-sync testing**

## A.7.3.53.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (740 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.54 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category M1 configured in CEMode A

### A.7.3.54.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category M1 UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.54.1-1, A.7.3.54.1-2, A.7.3.54.1-3 and A.7.3.54.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.54.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 20 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.54.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync tests in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out,\ Cat\ M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 16 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of PDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.54.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 | |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.54.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters defined in A.3.1.3 | | R.7 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR [Note 6] | dB | 0.37 | -6.98 | -14.98 |
| Propagation condition | | AWGN | | |

| | | |
|---|---|---|
| Correlation Matrix and Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.<br>Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.<br>Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.54.1-1. | | |

**Table A.7.3.54.1-3: DRX-Configuration for E-UTRAN HD-FDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.54.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

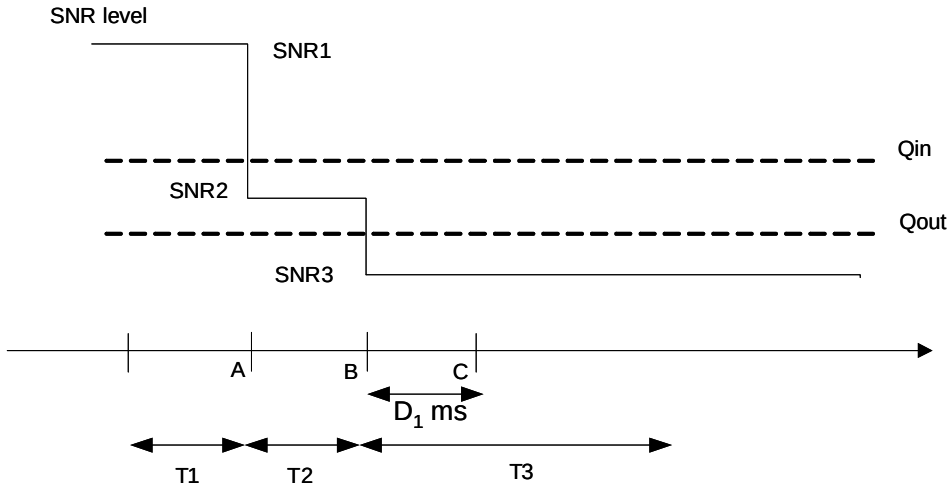


**Figure A.7.3.54.1-1: SNR variation for out-of-sync testing in DRX**

## A.7.3.54.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6520 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.55 E-UTRAN HD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category M1 configured in CEMode A

## A.7.3.55.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category M1 UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.55.1-1, A.7.3.55.1-2, A.7.3.55.1-3 and A.7.3.55.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.55.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 20 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.55.1-1: General test parameters for E-UTRAN HD-FDD in-sync test in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 8 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 24 | |
| | MPDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 40 | See Table A.7.3.55.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |

| | | | |
|---|---|---|---|
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 20 | |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.55.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.7 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 8 | dB | -4.58 | -10 | -18 | -10.58 | -4.58 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.55.1-1.

**Table A.7.3.55.1-3: DRX-Configuration for E-UTRAN HD-FDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.55.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|

| | | |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

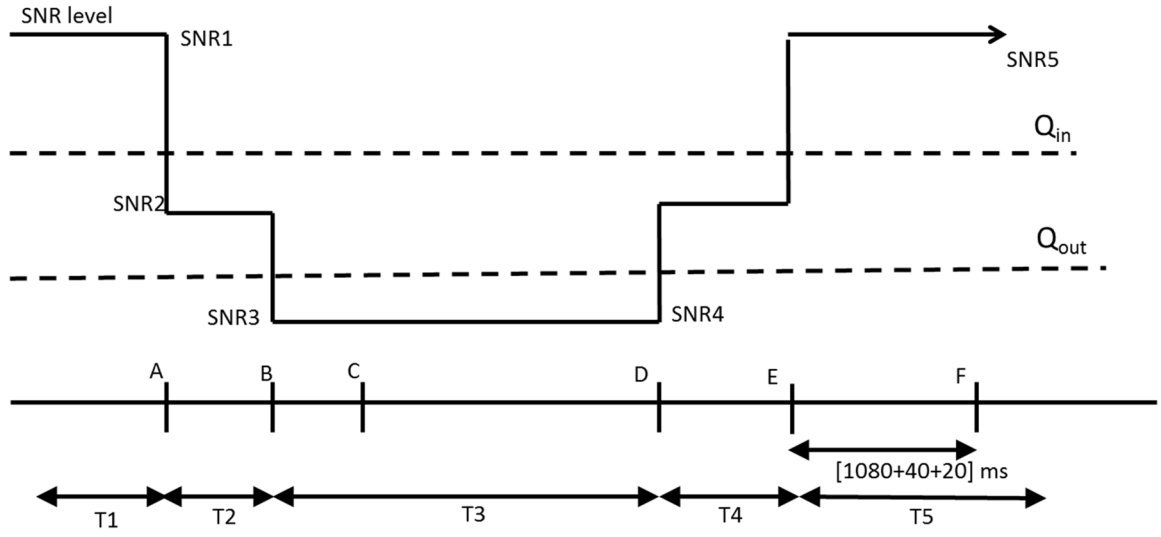


**Figure A.7.3.55.1-1: SNR variation for in-sync testing in DRX**

### A.7.3.55.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1140 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.56 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A

### A.7.3.56.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN TDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.56.1-1 and A.7.3.56.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.56.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.56.1-1: General test parameters for E-UTRAN TDD out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.56.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.15 TDD Note 8 | | |
| OCNG Pattern defined in A.3.2.2.11 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 7 | dB | -0.3 | -7.1 | -16.1 |

| | | |
|---|---|---|
| Propagation condition | | ETU 30Hz |
| Correlation Matrix and Antenna Configuration | | 2x1 Low |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.56.1-1.
Note 8: Aggregation level and repetition levels specified in A.7.3.56.1-1 are used for this test.

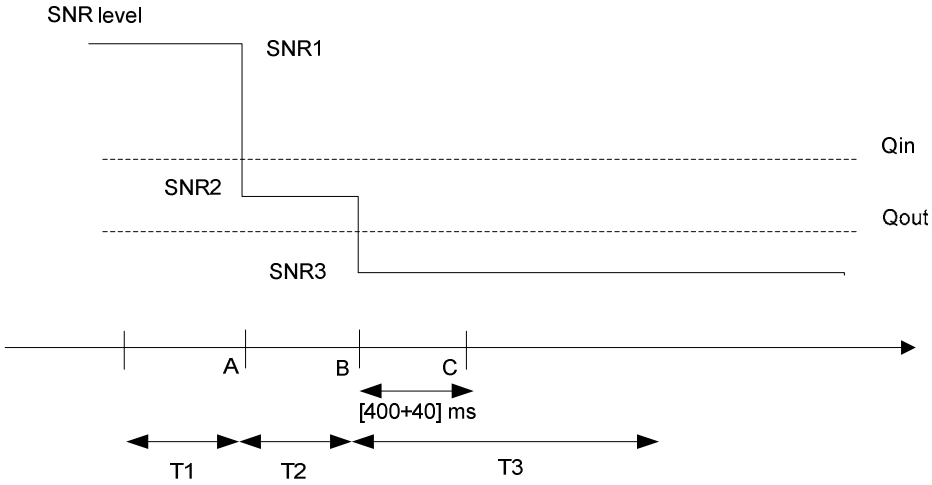


**Figure A.7.3.56.1-1: SNR variation for out-of-sync testing**

### A.7.3.56.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.57 E-UTRAN TDD Radio Link Monitoring Test for In-Sync for Cat-M1 UE in CEMode A

### A.7.3.57.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN TDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.57.1-1 and A.7.3.57.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5

respectively. Figure A.7.3.57.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 1 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.57.1-1: General test parameters for E-UTRAN TDD in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 4 | |
| | M-PDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.57.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.15 TDD | | | | |
| OCNG Pattern defined in A.3.2.2.11 (TDD) | | OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 2 | dB | | | | | |
| OCNG_RB Note 2 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR | dB | 5.1 | -3.8 | -12.8 | -1.9 | 5.1 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.57.1-1.

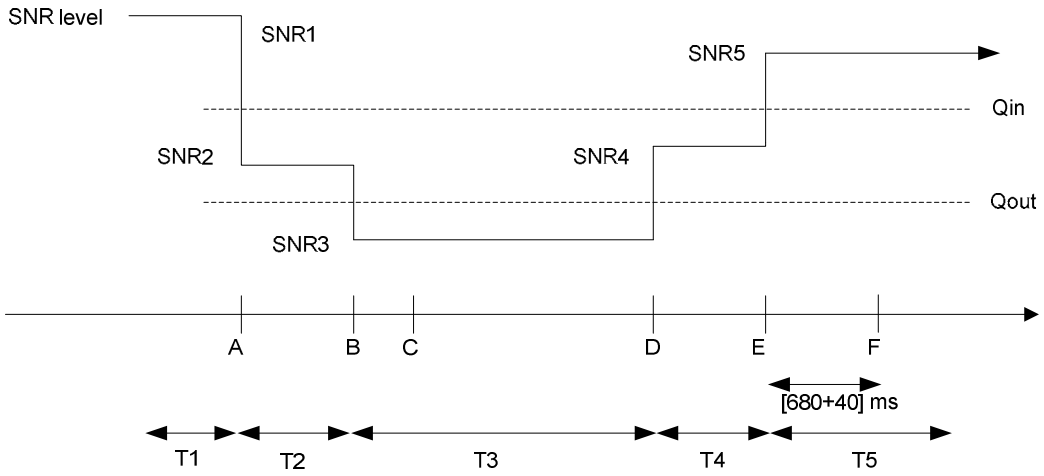


**Figure A.7.3.57.1-1: SNR variation for in-sync testing**

### A.7.3.57.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (720 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.58 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category M1 configured in CEMode A

### A.7.3.58.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category M1 UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.58.1-1, A.7.3.58.1-2, A.7.3.58.1-3 and A.7.3.58.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.58.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.58.1-1: General test parameters for E-UTRAN TDD out-of-sync tests in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out,\ Cat\ M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 16 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.58.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.58.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration | | 6 | | |
| Uplink-downlink configuration | | 1 | | |
| MPDCCH parameters defined in A.3.1.3 | | R.15 TDD | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| $OCNG_RA^{Note1}$ | dB | | | |
| $OCNG_RB^{Note1}$ | dB | | | |

| | | | | |
|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.55 | -6.88 | -14.88 |
| Propagation condition | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.58.1-1.

**Table A.7.3.58.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.58.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 27 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

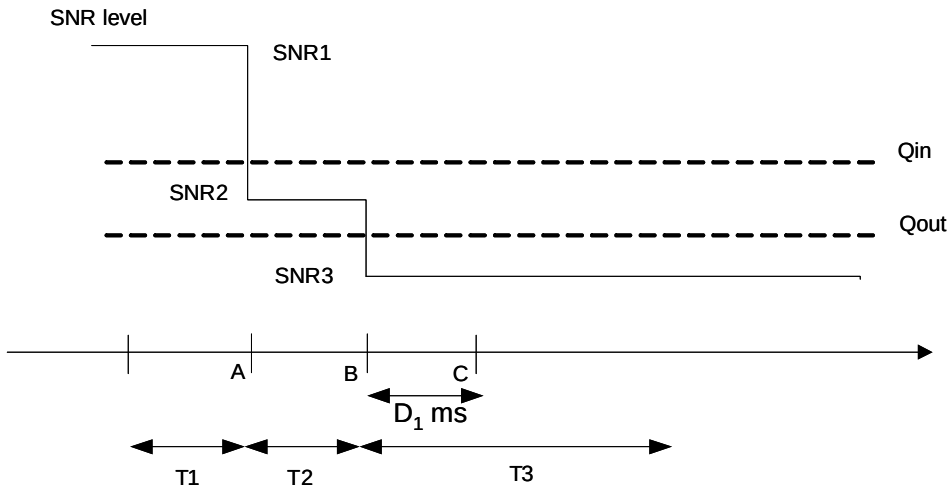


**Figure A.7.3.58.1-1: SNR variation for out-of-sync testing in DRX**

### A.7.3.58.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.59 E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for UE Category M1 configured in CEMode A

### A.7.3.59.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category M1 UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.59.1-1, A.7.3.59.1-2, A.7.3.59.1-3 and A.7.3.59.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.59.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.59.1-1: General test parameters for E-UTRAN TDD in-sync test in DRX for UE category M1 configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 8 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 24 | |
| | MPDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 40 | See Table A.7.3.59.1-3 |

| | | | |
|---|---|---|---|
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 1 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.59.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category M1 configured in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration | | 6 | | | | |
| Uplink-downlink configuration | | 1 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.15 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | **-3** | | | | |
| MPDCCH_RA | dB | **0** | | | | |
| MPDCCH_RB | dB | **0** | | | | |
| PBCH_RA | dB | **-3** | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA[Note1] | dB | | | | | |
| OCNG_RB[Note1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR [Note 8] | dB | -4.5 | -9.93 | -17.93 | -11.5 | -4.5 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.59.1-1.

**Table A.7.3.59.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |

| | | |
|---|---|---|
| shortDRX | disable | |

**Table A.7.3.59.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for UE category M1 configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 27 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

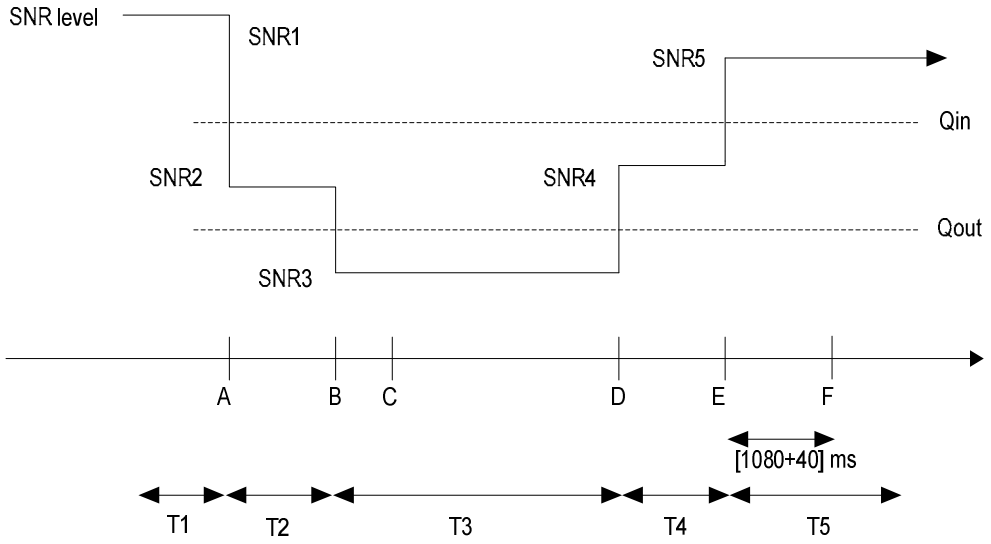


**Figure A.7.3.59.1-1: SNR variation for in-sync testing in DRX**

## A.7.3.59.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.60 HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage

## A.7.3.60.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.60.1-1, A.7.3.60.1-2, A.7.3.60.1-2A, A.7.3.60.1-3 and A.7.3.60.1-4. nCell 1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.60.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1

- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

  Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant. The UE shall not be provisioned with any more UL grants until the start of time period T4.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

  Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

  Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode the NPDCCH and complete the UL transmission when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.60.1-1: General test parameters for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | nCell 1 | |
| Neighbour cell | | eCell 1 | |
| CP length | | Normal | |
| Deployment Mode | | In-band | |
| NPDCCH transmission parameters $R_{max}$ | | 8 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| DRX cycle | ms | 256 | See Table A.7.3.60.1-3 |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 1000 | T311 is enabled |
| T1 | s | 5.12 | |
| dT | S | 0.8 | |
| T2 | s | 10.24 | |
| dT | S | 0.7 | |
| T3 | s | 5.12 | |
| dT | S | 1.4 | |
| T4 | s | 5.12 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.60.1-2: nCell specific test parameters for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NPDCCH parameters as defined in A.3.1.6.1 | | R.29 HD-FDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.60.1-2A | | | | | | |
| SNR Note 4, 5 | dB | -3.1 | Note 6 | -9.1 | Note 6 | -14.1 | Note 6 | -3.1 |
| Propagation condition | | AWGN | | | | | | |
| Configuration | | 2x1 | | | | | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.60.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

**Table A.7.3.60.1-2A: eCell 1 specific test parameters for HD-FDD Out-of-sync radio link monitoring test in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.60.1-3: DRX-Configuration for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.7.3 in TS 36.331 |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| drx-StartOffset | 0 | |

**Table A.7.3.60.1-4: *TimeAlignmentTimer* -Configuration for NB-IoT HD-FDD out-of-sync testing for UE category NB1 In-band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

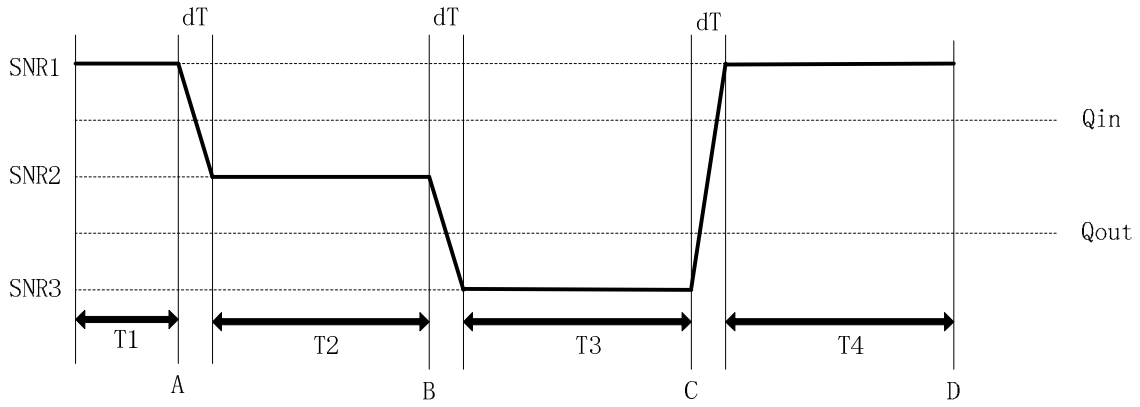


**Figure A.7.3.60.1-1: SNR variation for out-of-sync testing in DRX for NB-IoT HD-FDD out-of-sync testing for UE category NB1 In-band mode in normal coverage**

### A.7.3.60.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.61 HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage

### A.7.3.61.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.61.1-1, A.7.3.61.1-2, A.7.3.61.1-2A, A.7.3.61.1-3 and A.7.3.61.1-4. nCell 1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.61.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1

- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

  Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant. The UE shall not be provisioned with any more UL grants until the start of time period T4.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

  Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

  Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode the NPDCCH and complete the UL transmission when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.61.1-1: General test parameters for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | nCell 1 | |
| Neighbour cell | | eCell 1 | |
| CP length | | Normal | |
| Deployment Mode | | In-band | |
| NPDCCH transmission parameters $R_{max}$ | | 16 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| DRX cycle | ms | 256 | See Table A.7.3.61.1-3 |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 1000 | T311 is enabled |
| T1 | s | 5.12 | |
| dT | s | 0.7 | |
| T2 | s | 10.24 | |
| dT | s | 0.8 | |
| T3 | s | 5.12 | |
| dT | s | 1.4 | |
| T4 | s | 5.12 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.61.1-2: nCell specific test parameters for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NPDCCH parameters as defined in A.3.1.6.1 | | R.29 HD-FDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.61.1-2A | | | | | | |
| SNR Note 4, 5 | dB | -6.3 | Note 6 | -11.4 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | | | |
| Antenna Configuration | | 2x1 | | | | | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.61.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

**Table A.7.3.61.1-2A: eCell 1 specific test parameters for HD-FDD Out-of-sync radio link monitoring test in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.61.1-3: DRX-Configuration for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.7.3 in TS 36.331 |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| drx-StartOffset | 0 | |

**Table A.7.3.61.1-4: *TimeAlignmentTimer* -Configuration for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

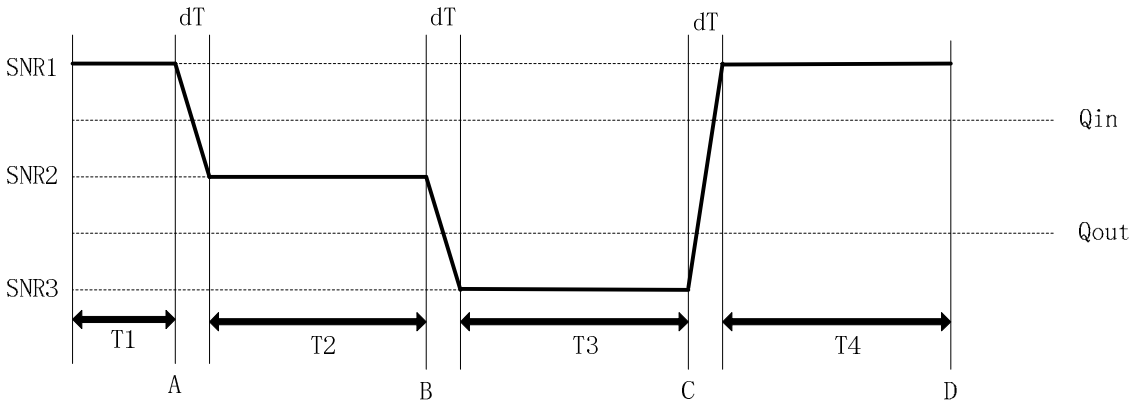


**Figure A.7.3.61.1-1: SNR variation for HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

### A.7.3.61.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4.

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.62 HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage

### A.7.3.62.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE configured in enhanced coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell when DRX is used. This test will partly verify the HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.62.1-1, A.7.3.62.1-2, A.7.3.62.1-3, A.7.3.62.1-4 and A.7.3.62.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.62.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in designated uplink subframes to transmit NPUSCH, which is received by the test equipment. By measuring the reception

of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2 and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. During the period from time point A to time point D, the UE shall not be provisioned with any UL grant.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. NPDCCH repetition level is determined by RRC parameter *npdcch-NumRepetitions* [3]. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.62.1-1: General test parameters for HD-FDD in-sync test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212[21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 4 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 16 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 256 | See Table A.7.3.62.1-4 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.62.1-2: nCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 180 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.6.1 | | R.27 HD-FDD | | | | |
| Ratio of NPDSCH to NRS EPRE | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA Note1 | dB | | | | | |
| NOCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.62.1-3 | | | | |
| SNR Note 5, Note 6 | dB | -6.3 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.62.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.62.1-3: eCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. |

**Table A.7.3.62.1-4: DRX-Configuration for E-UTRAN HD-FDD in-sync tests with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.7.3.62.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD in-sync tests with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

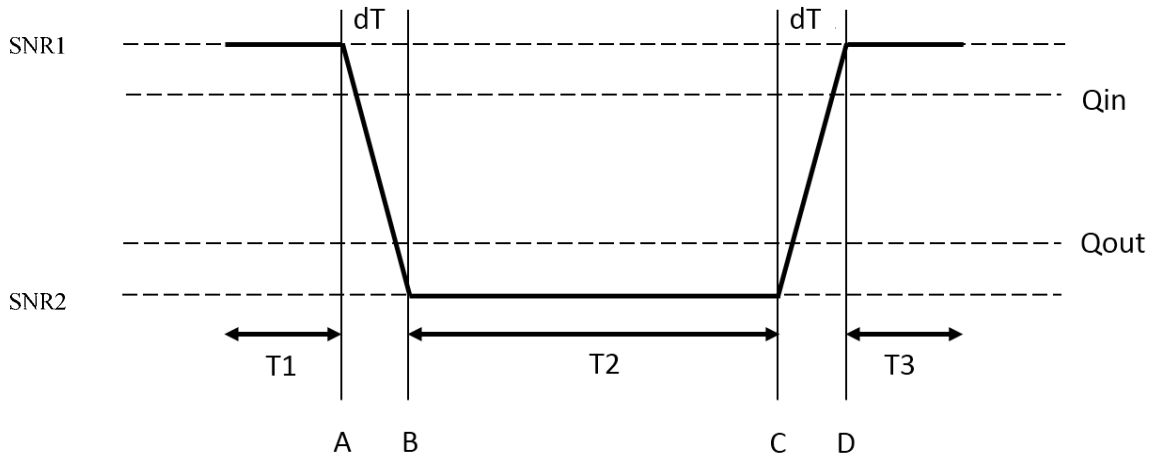


**Figure A.7.3.62.1-1: SNR variation for in-sync testing with DRX**

## A.7.3.62.2 Test Requirements

The UE behaviour in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.63 HD-FDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage

## A.7.3.63.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE configured in normal coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell when DRX is used. This test will partly verify the HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.63.1-1, A.7.3.63.1-2, A.7.3.63.1-3, A.7.3.63.1-4 and A.7.3.63.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.63.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in designated uplink subframes to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2 and T3 are as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. During the period from time point A to time point D, the UE shall not be provisioned with any UL grant.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. NPDCCH repetition level is determined by RRC parameter *npdcch-NumRepetitions* [2]. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.63.1-1: General test parameters for HD-FDD in-sync test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 2 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212[21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 |
| | NPDCCH aggregation level | eCCE | 2 | |

| | | | | |
|---|---|---|---|---|
| | NPDCCH repetition level | | 8 | and Table 7.23.2-1 respectively. |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 256 | See Table A.7.3.63.1-4 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.63.1-2: nCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 180 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.6.1 | | R.27 HD-FDD | | | | |
| Ratio of NPDSCH to NRS EPRE | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA Note1 | dB | | | | | |
| NOCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.63.1-3 | | | | |
| SNR Note 5, Note 6 | dB | -3.1 | Note 7 | -14.1 | Note 8 | -3.1 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.63.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.63.1-3: eCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 5 or 10 |

| | | |
|---|---|---|
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | |

**Table A.7.3.63.1-4: DRX-Configuration for E-UTRAN HD-FDD in-sync tests with DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.7.3.63.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD in-sync tests with DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

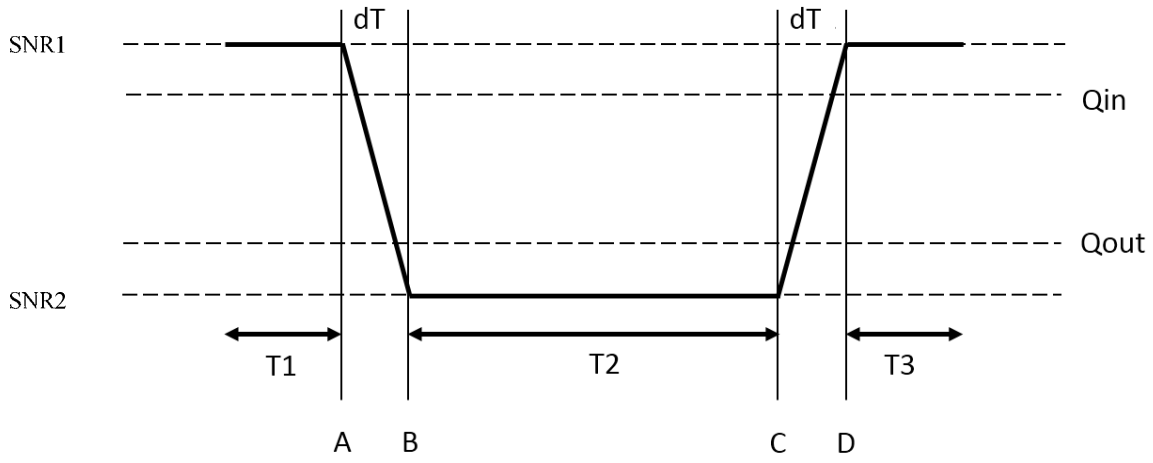


**Figure A.7.3.63.1-1: SNR variation for in-sync testing with DRX**

### A.7.3.63.2 Test Requirements

The UE behaviour in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.64 HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage

### A.7.3.64.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE configured in normal coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.64.1-1, A.7.3.64.1-2, A.7.3.64.1-3, A.7.3.64.1-4 and A.7.3.64.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.64.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in designated uplink subframes to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is disabled, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2, dT and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. During the period from time point A to time point D, the UE shall not be provisioned with any UL grant.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.64.1-1: General test parameters for HD-FDD in-sync test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 2 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212[21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 8 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.64.1-2: nCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 200 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.6.1 | | R.27 HD-FDD | | | | |
| NPDSCH_RA | | -3 | | | | |
| NPDSCH_RB | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA[Note1] | dB | | | | | |
| NOCNG_RB[Note1] | dB | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.64.1-3 | | | | |
| SNR Note 5, Note 6 | dB | -3.1 | Note 7 | -14.1 | Note 8 | -3.1 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.64.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.64.1-3: eCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 6 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.64.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD in-sync tests without DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

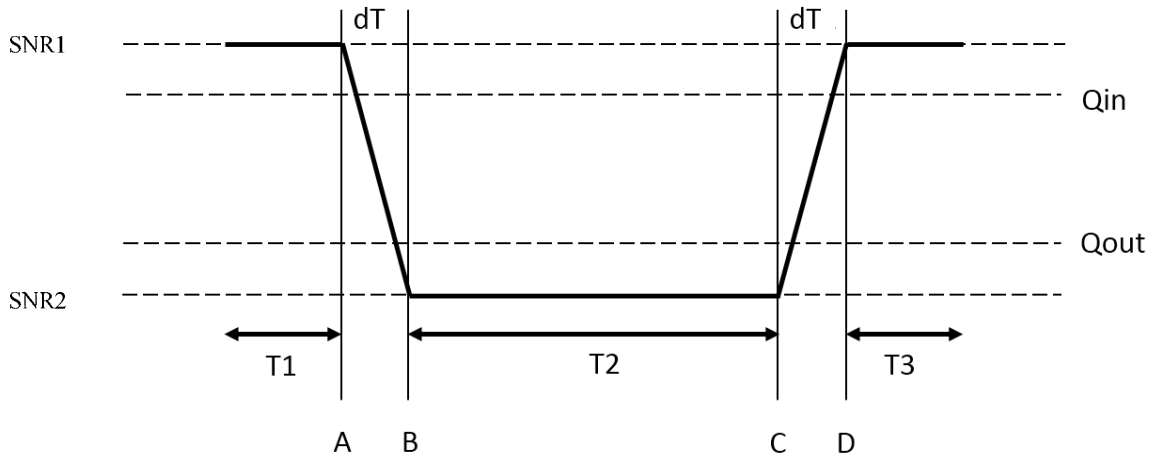


**Figure A.7.3.64.1-1: SNR variation for in-sync testing without DRX**

### A.7.3.64.2 Test Requirements

The UE behavior in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.65 HD-FDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage

### A.7.3.65.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE configured in enhanced coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.65.1-1, A.7.3.65.1-2, A.7.3.65.1-3, A.7.3.65.1-4 and A.7.3.65.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.65.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in designated uplink subframes to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is disabled, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2, dT and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. During the period from time point A to time point D, the UE shall not be provisioned with any UL grant.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.65.1-1: General test parameters for HD-FDD in-sync test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212[21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 4 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212[21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 16 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.65.1-2: nCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 200 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.6.1 | | R.27 HD-FDD | | | | |
| NPDSCH_RA | | -3 | | | | |
| NPDSCH_RB | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA[Note1] | dB | | | | | |
| NOCNG_RB[Note1] | dB | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.65.1-3 | | | | |
| SNR Note 5, Note 6 | dB | -6.3 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.65.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.65.1-3: eCell 1 specific test parameters for HD-FDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.65.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD in-sync tests without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |

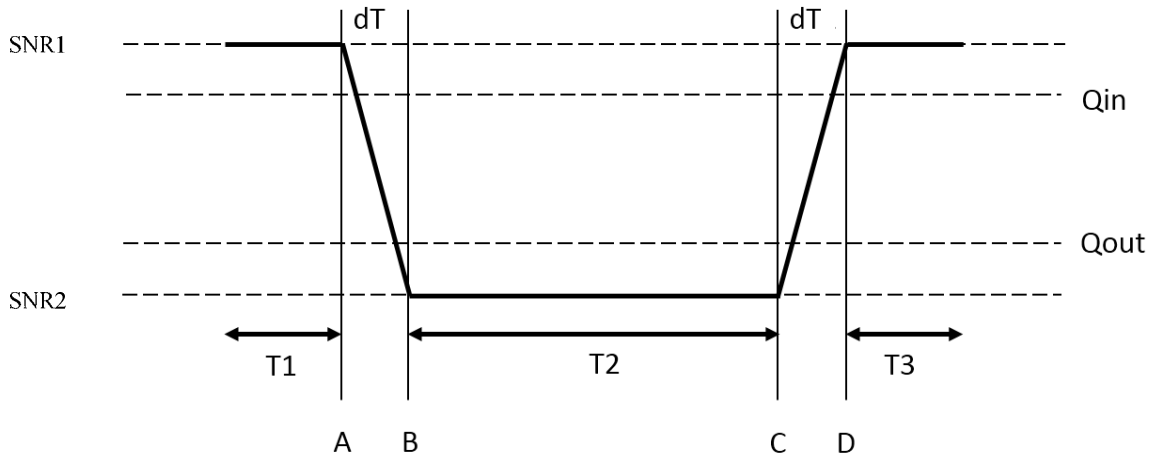


**Figure A.7.3.65.1-1: SNR variation for in-sync testing without DRX**

### A.7.3.65.2 Test Requirements

The UE behavior in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.66 HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 Standalone mode in Normal Coverage

### A.7.3.66.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.66.1-1 and A.7.3.66.1-2. nCell1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.66.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

  Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant. The UE shall not be provisioned with any more UL grants until the start of time period T4.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

**Table A.7.3.66.1-1: General test parameters for HD-FDD Radio Link Monitoring Test for out-of-sync tests without DRX for UE Category NB1 Standalone mode in normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |
| Active cell | | nCell 1 | |
| CP length | | Normal | |
| NPDCCH repetition level $R_{max}$ | | 8 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| DRX | | OFF | |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 3000 | T311 is enabled |
| T1 | s | 2 | |
| dT | s | 0.8 | |
| T2 | s | 0.4 | |
| dT | s | 0.7 | |
| T3 | s | 0.5 | |
| dT | s | 1.4 | |
| T4 | s | 0.4 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.66.1-2: nCell1 specific test parameters for HD-FDD Radio Link Monitoring Test for out-of-sync without DRX for UE Category NB1 Standalone mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **T1** | **dT** | **T2** | **dT** | **T3** | **dT** | **T4** |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | kHz | 180 | | | | | | |
| OCNG Pattern as defined in A.3.2.3.3 Note 1 | | NOP.3 FDD | | | | | | |
| NPDCCH parameters as defined in A.3.1.6.3 | | R.33 HD-FDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 KHz | -98 | | | | | | |
| SNR Note 4,5 | - | -3.1 | Note 6 | -9.1 | Note 7 | -14.1 | Note 6 | -3.1 |
| Propagation Condition | - | AWGN | | | | | | |
| Antenna Configuration | - | 2x1 | | | | | | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.<br>Note 2: Void<br>Note 3: Void<br>Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR2, SNR3 and SNR1 respectively in figure A.7.3.66.1-1. | | | | | | | | |

| | |
|---|---|
| Note 6: | The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT. |
| Note 7: | The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT. |
| Note 8: | The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT. |

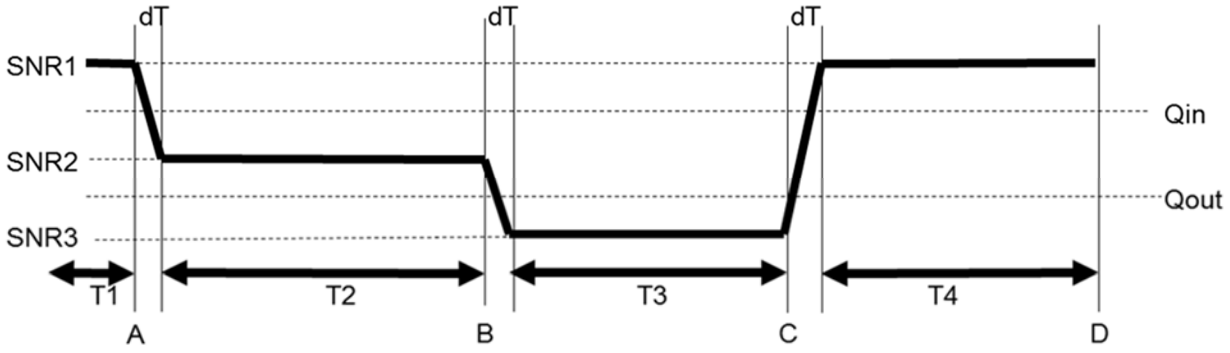


**Figure A.7.3.66.1-1: SNR variation for out-of-sync testing**

### A.7.3.66.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.67 HD-FDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 guard band mode in Enhanced Coverage

### A.7.3.67.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT HD-FDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.67.1-1 and A.7.3.67.1-2 below. nCell1 is the active NB-IoT cell, in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.67.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure.

- Before the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 with duration dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH.

  Note: The UE is expected to decode NPDCCH and complete the UL transmission during T2 according to the UL grant. The UE shall not be provisioned with any more UL grants until the start of time period T4.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 with duration dT
- During T3, the SNR is kept at SNR3.

Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with duration dT

- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

Note: The UE is not expected to decode the UL grant and conduct the UL transmission during T4 since the UE is expected to declare RLF during T3.

**Table A.7.3.67.1-1: General test parameters for HD-FDD Radio Link Monitoring Test for out-of-sync tests without DRX for UE Category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Guardband | |
| Active cell | | nCell 1 | |
| CP length | | Normal | |
| NB-IoT RF Channel Number | | 1 | One NB-IoT carrier frequency |
| NPDCCH repetition level $R_{max}$ | | 16 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| DRX | | OFF | |
| Layer 3 filtering Note 2 | | Enabled | Counters: N310 = 1 N311 = 1 |
| T310 timer Note 2 | ms | 0 | T310 is disabled |
| T311 timer Note 2 | ms | 3000 | T311 is enabled |
| T1 | s | 2 | |
| dT | s | 0.7 | |
| T2 | s | 0.4 | |
| dT | s | 0.8 | |
| T3 | s | 0.5 | |
| dT | s | 1.4 | |
| T4 | s | 0.4 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.67.1-2: nCell1 specific test parameters for HD-FDD Radio Link Monitoring Test for out-of-sync without DRX for UE Category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 5MHz: 25<br>eCell 1 $BW_{channel}$ 10MHz: 50 | | | | | | |
| NPDCCH parameters as defined in A.3.1.6.5 | | R.37 HD-FDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ | dBm/15 KHz | Specified in Table A.7.3.67.1-3 | | | | | | |
| SNR Note 4,5 | - | -6.3 | Note 6 | -11.4 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation Condition | - | AWGN | | | | | | |
| Antenna Configuration | - | 2x1 | | | | | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2, T3 and T4 is denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.67.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

**Table A.7.3.67.1-3: eCell 1 specific test parameters for HD-FDD out-of-sync radio link monitoring test without DRX for UE category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 5 or 10 |
| NOCNG Pattern | - | $BW_{channel}$ 5MHz: NOP.5 FDD<br>$BW_{channel}$ 10MHz: NOP.2 FDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

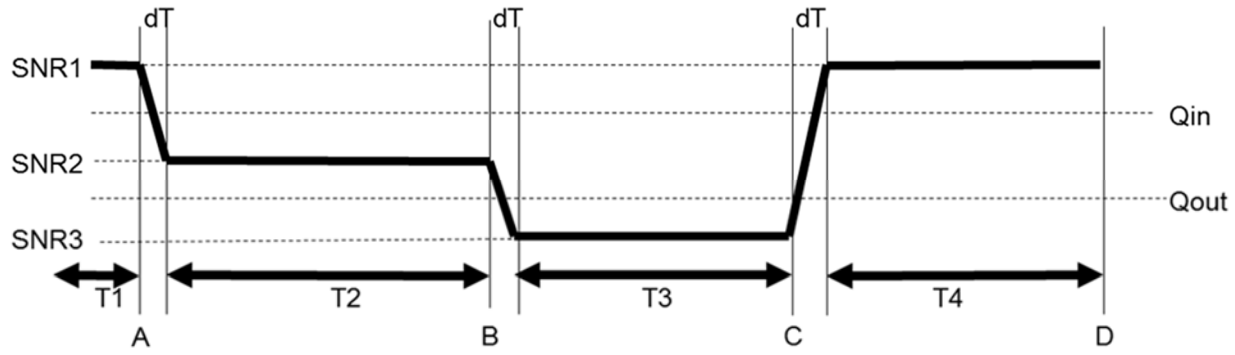


**Figure A.7.3.67.1-1: SNR variation for out-of-sync testing**

### A.7.3.67.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behave correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.68 E-UTRAN FD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEMode A

### A.7.3.68.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.68.1-1 and A.7.3.68.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.68.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.68.1-1: General test parameters for E-UTRAN FD-FDD early out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |

| | | | |
|---|---|---|---|
| T310 timer | ms | 0 | T310 is disabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T1 | s | 2 | |
| T2 | s | 0.8 | |
| T3 | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.68.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 3: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.68.1-1.

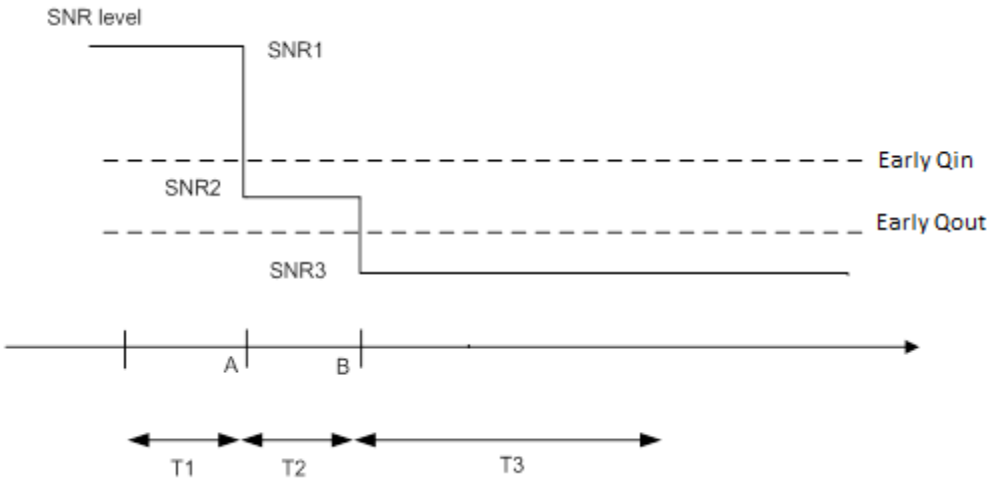


**Figure A.7.3.68.1-1: SNR variation for early out-of-sync testing**

### A.7.3.68.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.2.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.69 E-UTRAN HD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEMode A

### A.7.3.69.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.69.1-1 and A.7.3.69.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.69.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.69.1-1: General test parameters for E-UTRAN HD-FDD early out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 4 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.69.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.2 | | R.7 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 3: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.69.1-1.

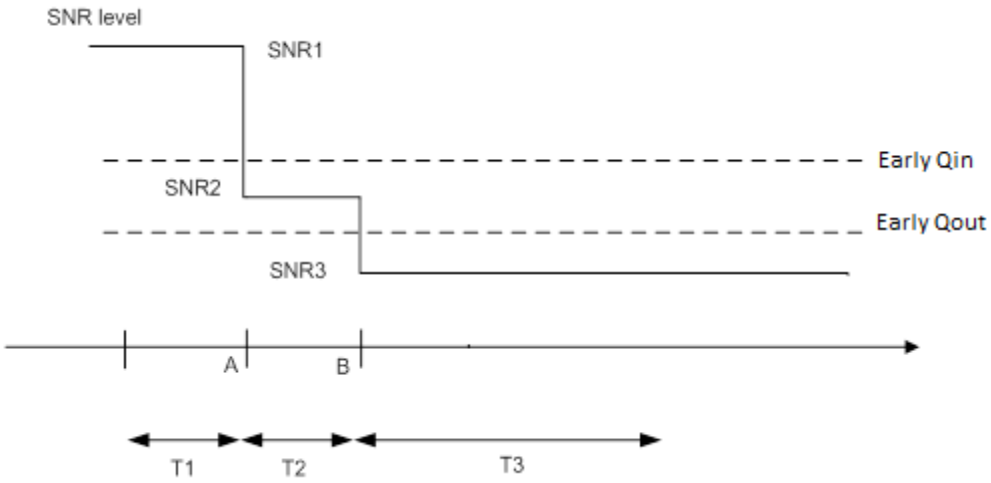


**Figure A.7.3.69.1-1: SNR variation for early out-of-sync testing**

### A.7.3.69.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.3.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.70 E-UTRAN TDD Early Out-of-sync reporting Test for Cat-M1 UE in CEMode A

### A.7.3.70.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.70.1-1 and A.7.3.70.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.70.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.70.1-1: General test parameters for E-UTRAN TDD early out-of-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 4 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.70.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3.3 | | R.15 TDD Note 7 | | |
| OCNG Pattern defined in A.3.2.2.11 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -0.3 | -7.1 | -16.1 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.70.1-1.
Note 7: Aggregation level and repetition levels specified in A.7.3.70.1-1 are used for this test.

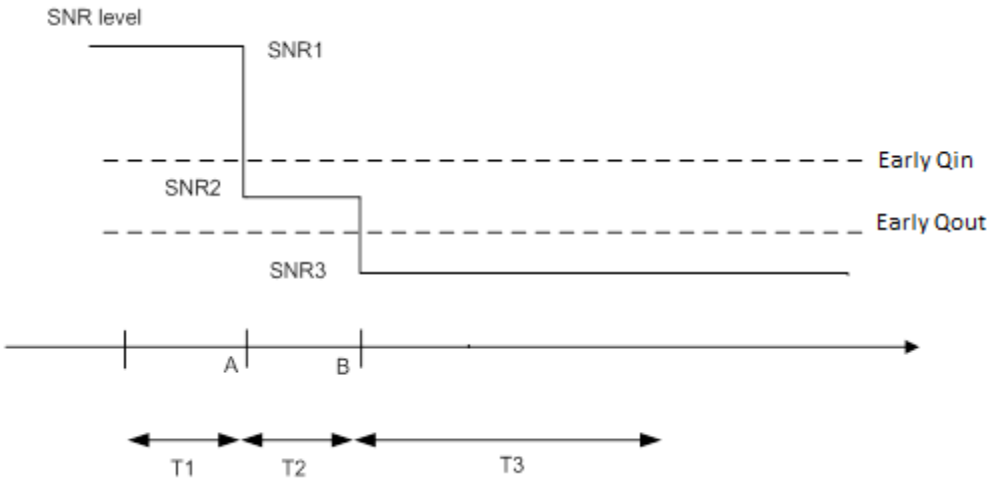


**Figure A.7.3.70.1-1: SNR variation for early out-of-sync testing**

### A.7.3.70.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.2.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.71 E-UTRAN FD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA

### A.7.3.71.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.71.1-1 and A.7.3.71.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.71.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.71.1-1: General test parameters for E-UTRAN FD-FDD early in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 1 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.71.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.71.1-1.

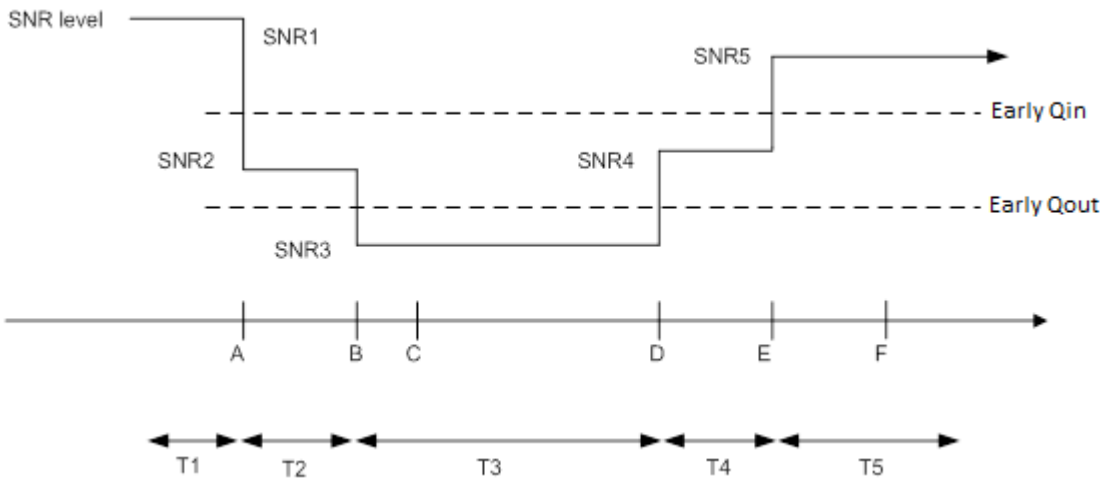


**Figure A.7.3.71.1-1: SNR variation for early in-sync testing**

### A.7.3.71.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.2.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.72 E-UTRAN HD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA

### A.7.3.72.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.72.1-1 and A.7.3.72.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.72.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.72.1-1: General test parameters for E-UTRAN HD-FDD early in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 1 | |
| | $\rho_A$, $\rho_B$ | | -3 | |

| | | | |
|---|---|---|---|
| DRX | | OFF | |
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T1 | s | 2 | |
| T2 | s | 0.8 | |
| T3 | s | 1.36 | |
| T4 | s | 0.4 | |
| T5 | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.72.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.2 | | R.7 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA[Note 1] | dB | | | | | |
| OCNG_RB[Note 1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR [Note 6] | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.72.1-1.

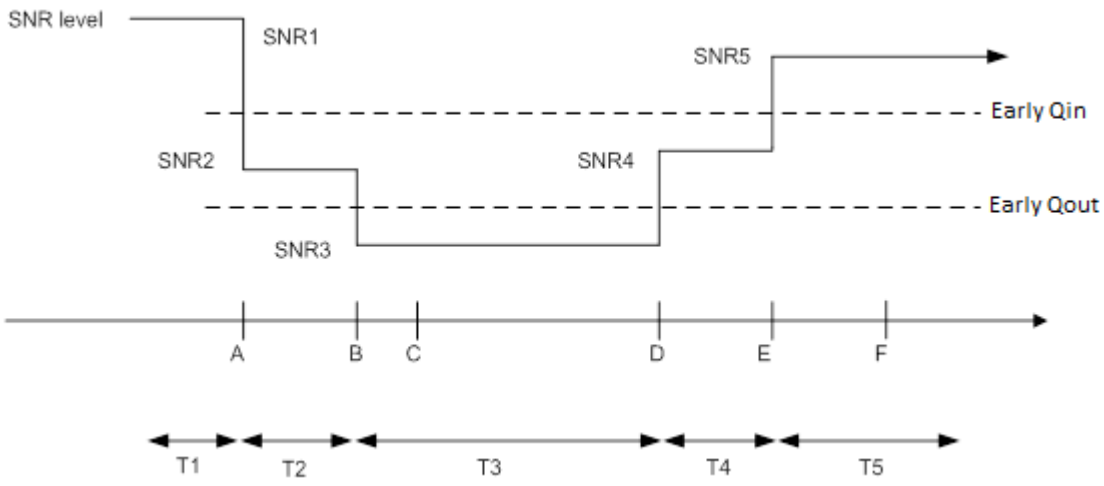


**Figure A.7.3.72.1-1: SNR variation for early in-sync testing**

### A.7.3.72.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.2.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.73 E-UTRAN TDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA

### A.7.3.73.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.73.1-1 and A.7.3.73.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.73.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.73.1-1: General test parameters for E-UTRAN TDD early in-sync testing for UE Cat-M1 in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 1 | |
| | $\rho_A$, $\rho_B$ | | -3 | |

| | | | |
|---|---|---|---|
| DRX | | OFF | |
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T1 | s | 2 | |
| T2 | s | 0.8 | |
| T3 | s | 1.36 | |
| T4 | s | 0.4 | |
| T5 | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.73.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| MPDCCH parameters as defined in A.3.1.3.3 | | R.15 TDD | | | | |
| OCNG Pattern defined in A.3.2.1.11 (TDD) | | OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.73.1-1.

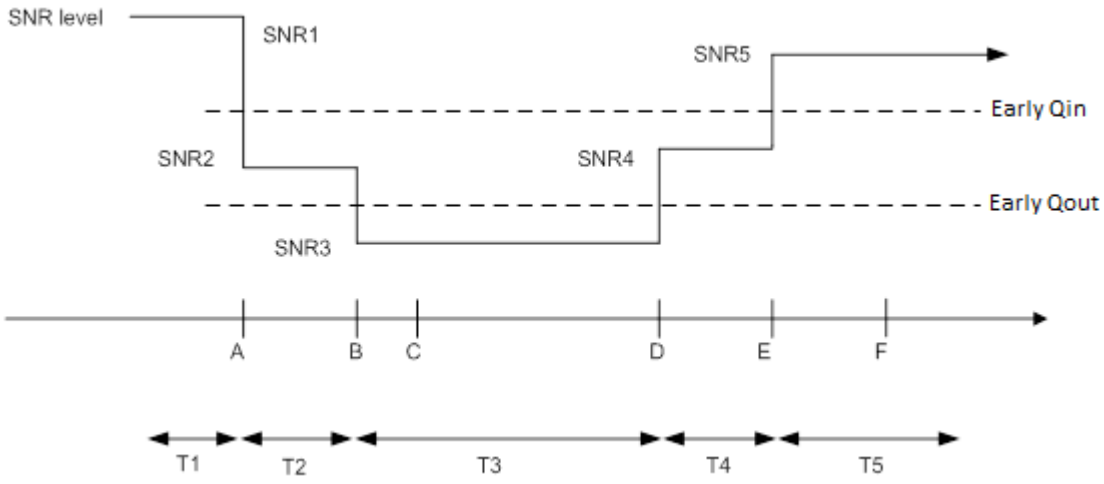


**Figure A.7.3.73.1-1: SNR variation for early in-sync testing**

### A.7.3.73.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.2.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.74 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for non-BL CE UE in CEMode A

### A.7.3.74.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD non-BL CE UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for non-BL CE UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.74.1-1 and A.7.3.74.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.74.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.74.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync testing for non-BL CE UE in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH |

| | | | | |
|---|---|---|---|---|
| | M-PDCCH aggregation level | eCCE | 24 | transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.74.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests for non-BL CE UE in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -1.5 | -7.9 | -15.9 Note 7 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low<br>2x4 Low | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 3: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 4: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 5: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 6: | The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.74.1-1. |
| Note 7: | For 4 Rx UE, SNR in T3 is -18.0 dB. |

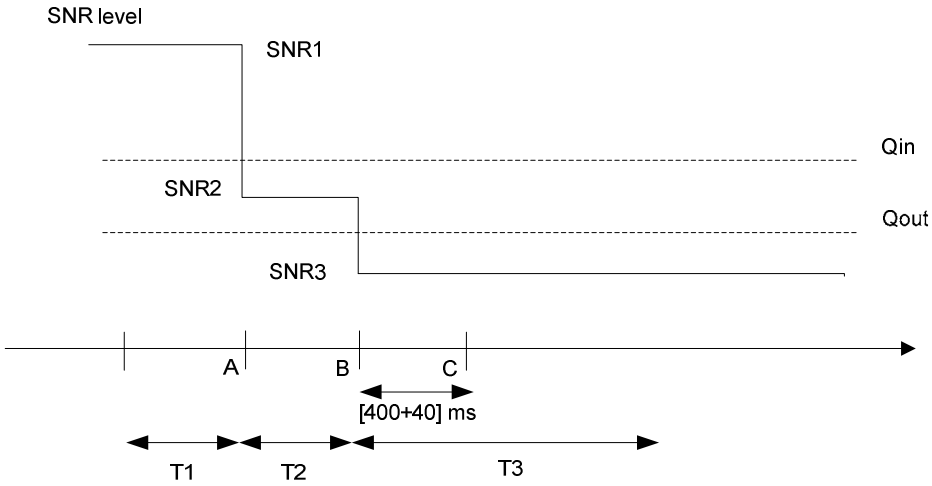


**Figure A.7.3.74.1-1: SNR variation for out-of-sync testing**

### A.7.3.74.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.75 E-UTRAN FD-FDD Radio Link Monitoring Test for In-Sync for non-BL CE UE in CEMode A

### A.7.3.75.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD non-BL CE UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for non-BL CE UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.75.1-1 and A.7.3.75.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.75.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.75.1-1: General test parameters for E-UTRAN FD-FDD in-sync testing for non-BL CE UE in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 4 | |
| | M-PDCCH repetition level | | 1 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.75.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring tests for non-BL CE UE in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.17 FDD | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 3.3 | -4.8 | -12.8 Note 7 | -2.8 | 3.3 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low<br>2x4 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.75.1-1.
Note 7: For 4 Rx UE, SNR in T3 is -15.0 dB.

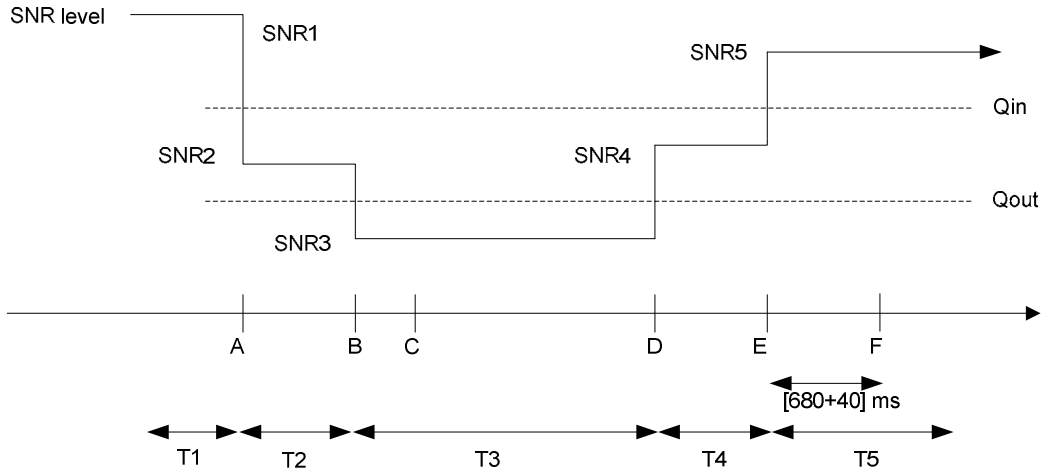


**Figure A.7.3.75.1-1: SNR variation for in-sync testing**

## A.7.3.75.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (720 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.76 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for non-BL CE UE configured in CEMode A

## A.7.3.76.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD non-BL CE UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.76.1-1, A.7.3.76.1-2, A.7.3.76.1-3 and A.7.3.76.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.76.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.76.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync tests in DRX for non-BL CE UE configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out,\ Cat\ M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 16 | |
| | MPDCCH repletion level | | 2 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.76.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.76.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for non-BL CE UE configured in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters defined in A.3.1.3 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note1 | dB | | | |
| OCNG_RB Note1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -0.9 | -7.7 | -14.7 Note 7 |
| Propagation condition | | AWGN | | |

| | | |
|---|---|---|
| Correlation Matrix and Antenna Configuration | | 2x2<br>2x4 |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.<br>Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.<br>Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.76.1-1.<br>Note 7: For 4 Rx UE, SNR in T3 is -17.2 dB. | | |

**Table A.7.3.76.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.76.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

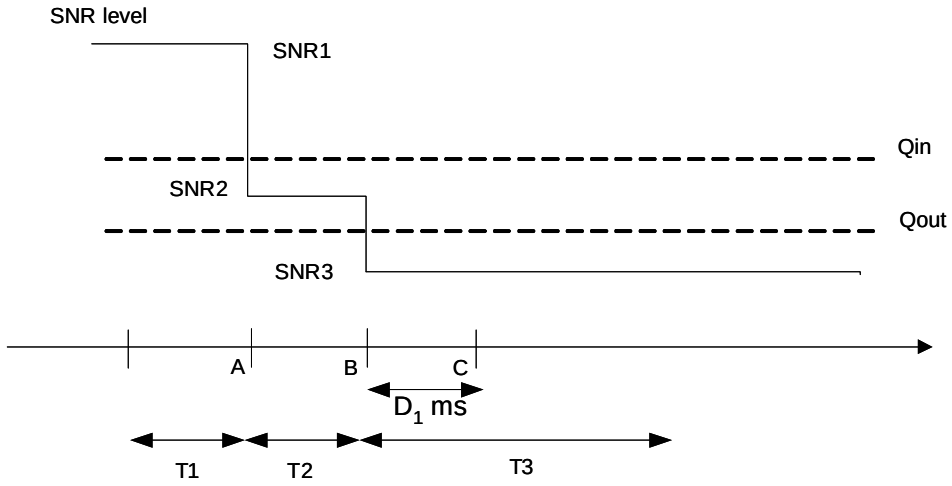


**Figure A.7.3.76.1-1: SNR variation for out-of-sync testing in DRX**

## A.7.3.76.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.77 E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for non-BL CE UE configured in CEMode A

## A.7.3.77.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD non-BL CE UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.77.1-1, A.7.3.77.1-2, A.7.3.77.1-3 and A.7.3.77.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.77.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.77.1-1: General test parameters for E-UTRAN FD-FDD in-sync test in DRX for non-BL CE UE configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 8 | |
| | MPDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 24 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 40 | See Table A.7.3.77.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |

| | | | |
|---|---|---|---|
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 2 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.77.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for non-BL CE UE configured in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.17 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -5.7 | -9.5 | -16.5 Note 7 | -11.2 | -5.2 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2<br>2x4 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.77.1-1.
Note 7: For 4 Rx UE, SNR in T3 is -19.5 dB.

**Table A.7.3.77.1-3: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.77.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

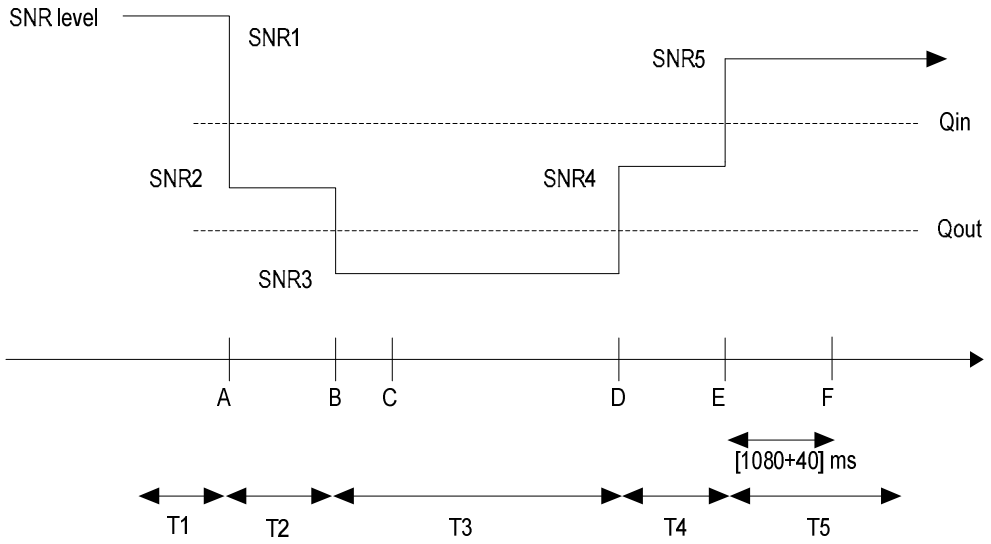


**Figure A.7.3.77.1-1: SNR variation for in-sync testing in DRX**

### A.7.3.77.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.78 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for non-BL CE UE in CEMode A

### A.7.3.78.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD non-BL CE UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN TDD radio link monitoring requirements for non-BL CE UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.78.1-1 and A.7.3.78.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.78.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.78.1-1: General test parameters for E-UTRAN TDD out-of-sync testing for non-BL CE UE in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.78.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests for non-BL CE CE in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3 | | R.15 TDD Note 8 | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |

| | | | | |
|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 7 | dB | -1.5 | -7.9 | -15.9 Note 9 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low<br>2x4 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.78.1-1.
Note 8: Aggregation level and repetition levels specified in A.7.3.78.1-1 are used for this test.
Note 9: For 4 Rx UE, SNR in T3 is -18.0 dB.

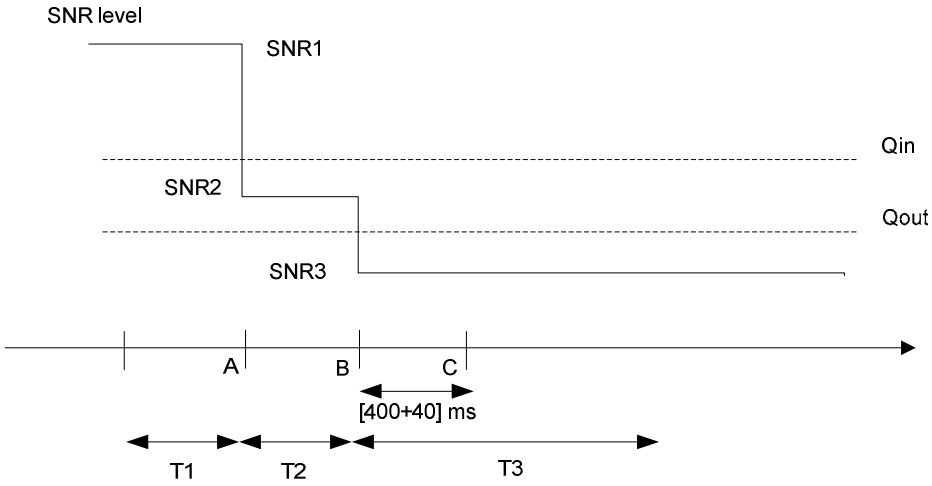


**Figure A.7.3.78.1-1: SNR variation for out-of-sync testing**

## A.7.3.78.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.79 E-UTRAN TDD Radio Link Monitoring Test for In-Sync for non-BL CE UE in CEMode A

## A.7.3.79.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD non-BL CE UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA. This test will partly verify the E-UTRAN TDD radio link monitoring requirements for non-BL CE UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.79.1-1 and A.7.3.79.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.79.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 1 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.79.1-1: General test parameters for E-UTRAN TDD in-sync testing for non-BL CE UE in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 4 | |
| | M-PDCCH repetition level | | 1 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repletion level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |

| | | | |
|---|---|---|---|
| T3 | s | 1.36 | |
| T4 | s | 0.4 | |
| T5 | s | 2 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.79.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring tests for non-BL CE UE in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| MPDCCH parameters as defined in A.3.1.3 | | R.15 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 2 | dB | | | | | |
| OCNG_RB Note 2 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 3.3 | -4.8 | -12.8 Note 8 | -2.8 | 3.3 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2<br>2x4 | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.79.1-1.
Note 8: For 4 Rx UE, SNR in T3 is -15.0 dB.

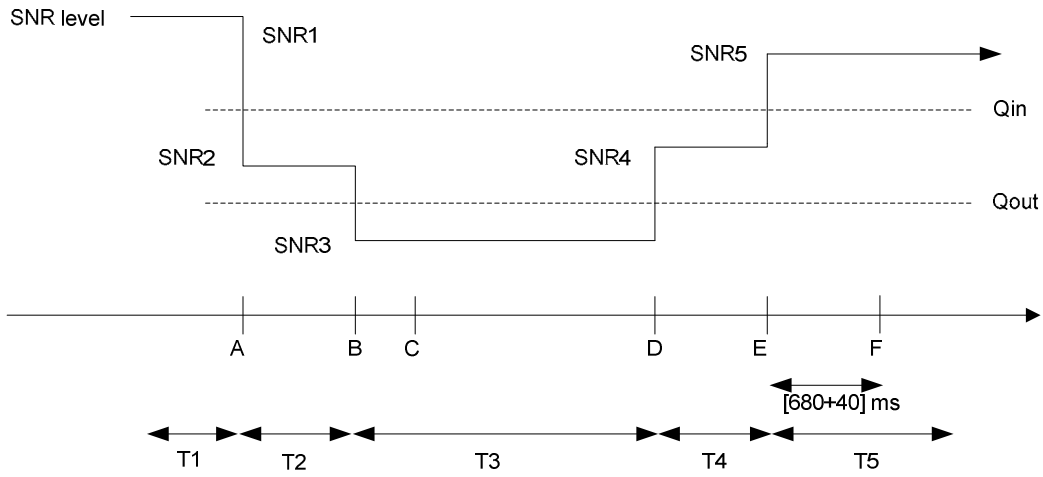


**Figure A.7.3.79.1-1: SNR variation for in-sync testing**

### A.7.3.79.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (720 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.80 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for non-BL CE UE configured in CEMode A

### A.7.3.80.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD non-BL CE UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.80.1-1, A.7.3.80.1-2, A.7.3.80.1-3 and A.7.3.80.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.80.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.80.1-1: General test parameters for E-UTRAN TDD out-of-sync tests in DRX for non-BL CE UE configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 16 | |
| | MPDCCH repletion level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 1280 | See Table A.7.3.80.1-3 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 32 | |
| T2 | | s | 12.8 | |
| T3 | | s | 13 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.80.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for non-BL CE UE configured in CEMode A**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration | | 6 | | |
| Uplink-downlink configuration | | 1 | | |
| MPDCCH parameters defined in A.3.1.3 | | R.15 TDD | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |

| | | | | |
|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | -0.9 | -7.7 | -14.7 Note 7 |
| Propagation condition | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 2x2<br>2x4 | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.80.1-1.
Note 7: For 4 Rx UE, SNR in T3 is -17.2 dB.

**Table A.7.3.80.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.7.3.80.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

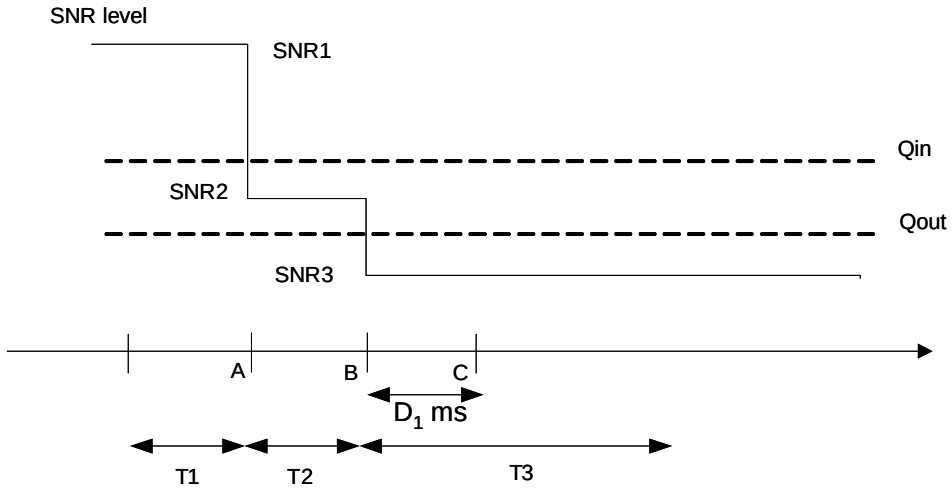


**Figure A.7.3.80.1-1: SNR variation for out-of-sync testing in DRX**

### A.7.3.80.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration $D_1$ = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.81 E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for non-BL CE UE configured in CEMode A

### A.7.3.81.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD non-BL CE UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the E-UTRAN TDD radio link monitoring requirements in clause 7.19.

The test parameters are given in Tables A.7.3.81.1-1, A.7.3.81.1-2, A.7.3.81.1-3 and A.7.3.81.1-4. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.3.81.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.81.1-1: General test parameters for E-UTRAN TDD in-sync test in DRX for non-BL CE UE configured in CEMode A**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | In sync threshold $Q_{in, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 8 | |
| | MPDCCH repetition level | | 2 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out, Cat M1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19.2 and Table 7.19.2-1 respectively. |
| | MPDCCH aggregation level | eCCE | 24 | |
| | MPDCCH repetition level | | 4 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| | Ratio of MPDCCH to RS EPRE | dB | 0 | |
| DRX cycle | | ms | 40 | See Table A.7.3.81.1-3 |

| | | | |
|---|---|---|---|
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 2000 | T310 is enabled |
| T311 timer | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | ms | 1 | Minimum CQI reporting periodicity |
| T1 | s | 4 | |
| T2 | s | 1.6 | |
| T3 | s | 1.46 | |
| T4 | s | 0.4 | |
| T5 | s | 4 | |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.81.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for in-sync radio link monitoring test in DRX for non-BL CE UE configured in CEMode A**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 10 | | | | |
| Special subframe configuration | | 6 | | | | |
| Uplink-downlink configuration | | 1 | | | | |
| MPDCCH parameters defined in A.3.1.3 | | R.15 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -5.7 | -9.5 | -16.5 Note 7 | -11.2 | -5.2 |
| Propagation condition | | AWGN | | | | |
| Correlation Matrix and Antenna Configuration | | 2x2<br>2x4 | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.81.1-1.
Note 7: For 4 Rx UE, SNR in T3 is -19.5 dB.

**Table A.7.3.81.1-3: DRX-Configuration for E-UTRAN TDD out-of-sync tests for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |

| | | |
|---|---|---|
| longDRX-CycleStartOffset | sf40 | |
| shortDRX | disable | |

**Table A.7.3.81.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD out-of-sync testing for non-BL CE UE configured in CEMode A**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |

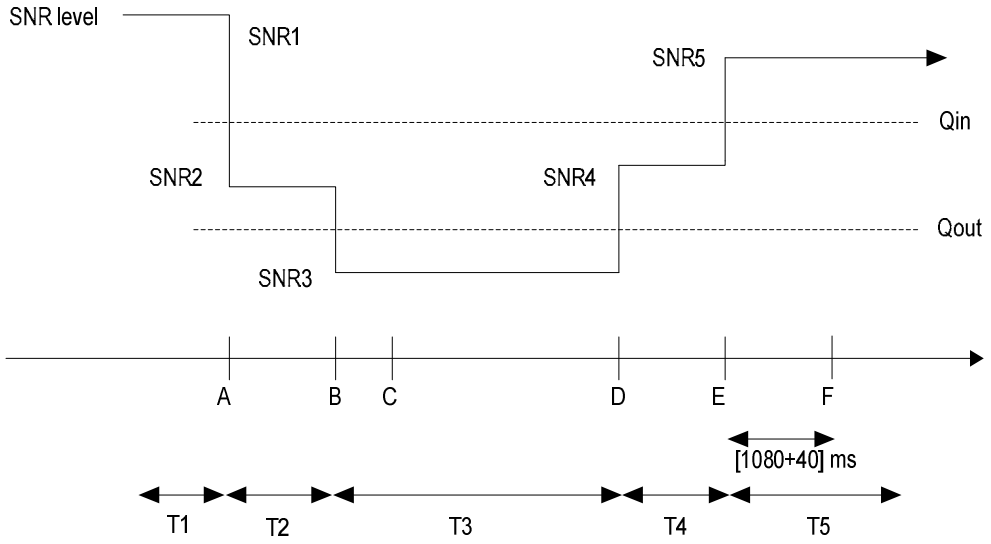


**Figure A.7.3.81.1-1: SNR variation for in-sync testing in DRX**

## A.7.3.81.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.82 E-UTRAN FD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB

## A.7.3.82.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.82.1-1 and A.7.3.82.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.82.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.82.1-1: General test parameters for E-UTRAN FD-FDD early out-of-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 1800 | T310 is enabled |
| T314 timer | | ms | 0 | T314 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.82.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.6 | -22.6 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 3: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 4: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 5: | The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.82.1-1. |

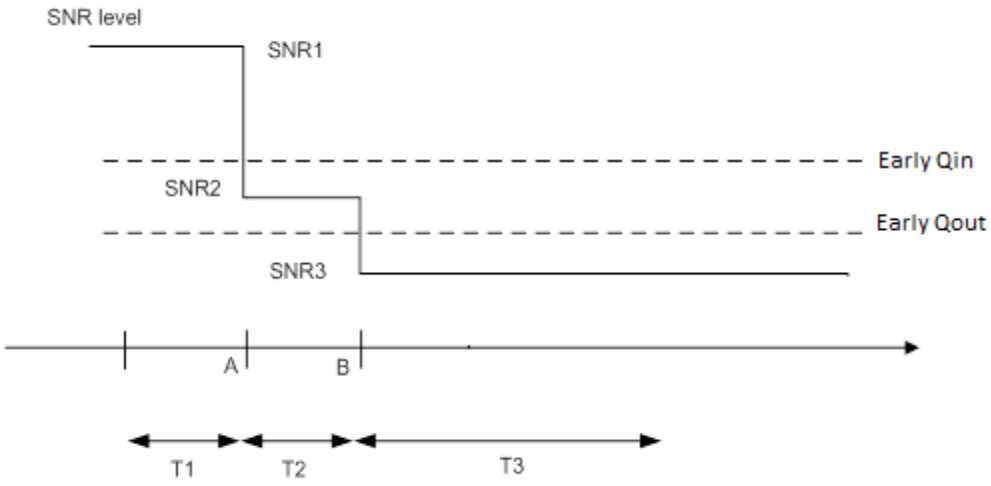


**Figure A.7.3.82.1-1: SNR variation for early out-of-sync testing**

### A.7.3.82.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.83 E-UTRAN FD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeB

### A.7.3.83.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.83.1-1 and A.7.3.83.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.83.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.83.1-1: General test parameters for E-UTRAN FD-FDD early in-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 16 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T315 | | ms | 0 | T315 is disabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.83.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -7 | -16.6 | -22.6 | -15 | -7 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 3: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 4: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 5: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 6: | The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.49.1-1. |

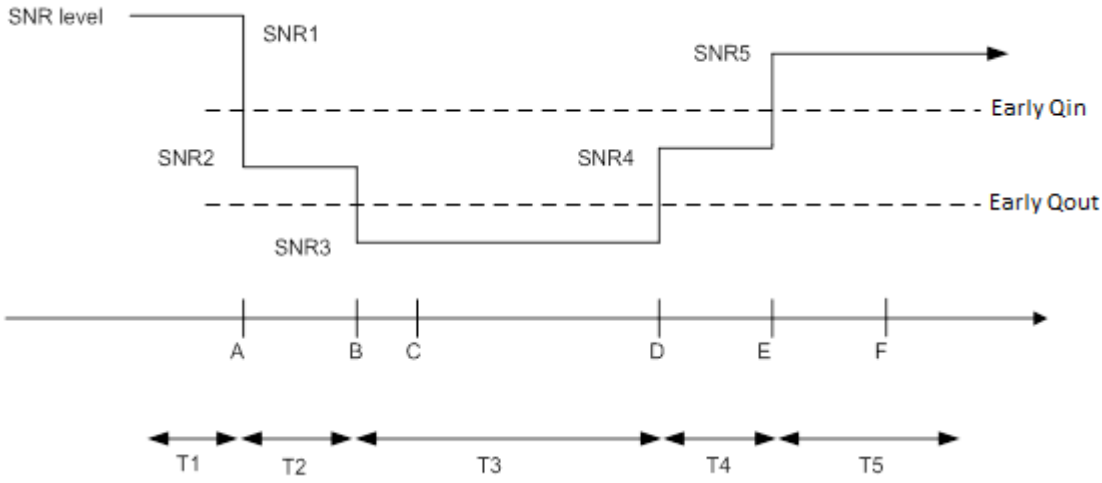


**Figure A.7.3.83.1-1: SNR variation for early in-sync testing**

### A.7.3.83.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.84 E-UTRAN HD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB

### A.7.3.84.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.84.1-1 and A.7.3.84.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.84.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.84.1-1: General test parameters for E-UTRAN HD-FDD early out-of-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |

| | | | | |
|---|---|---|---|---|
| Early Out of sync transmission parameters (Note 1) | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 1800 | T310 is enabled |
| T314 timer | | ms | 0 | T314 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.84.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.6 | -22.6 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 3: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.84.1-1.

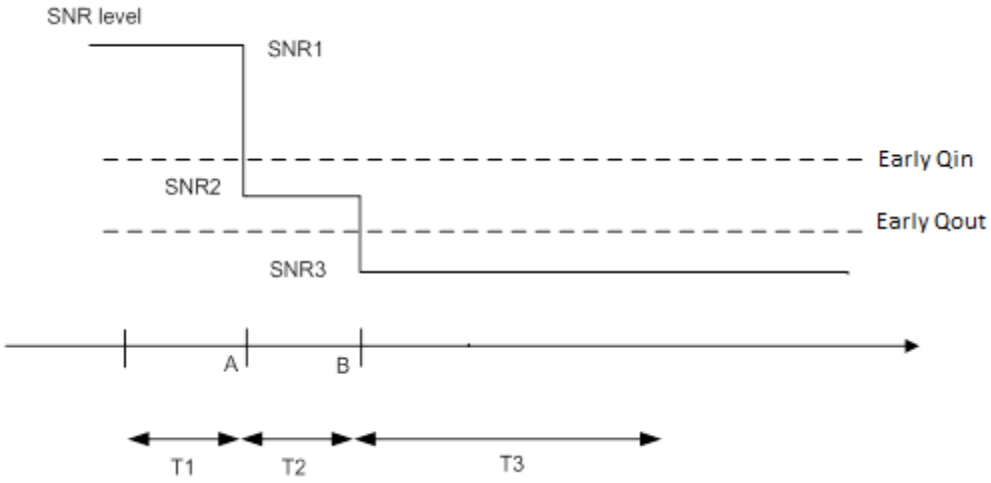


**Figure A.7.3.84.1-1: SNR variation for early out-of-sync testing**

### A.7.3.84.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.85 E-UTRAN HD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeB

### A.7.3.85.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.85.1-1 and A.7.3.85.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.85.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.85.1-1: General test parameters for E-UTRAN HD-FDD early in-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 16 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T315 | | ms | 0 | T315 is disabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.85.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | | | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -7 | -16.6 | -22.6 | -15 | -7 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.3.85.1-1.

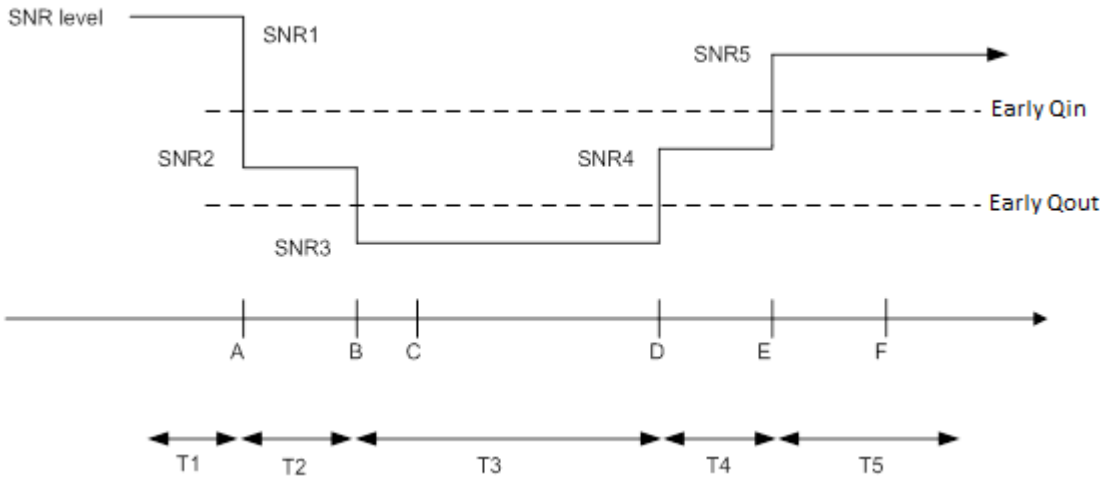


**Figure A.7.3.85.1-1: SNR variation for early in-sync testing**

### A.7.3.85.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.86 E-UTRAN TDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB

### A.7.3.86.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.86.1-1 and A.7.3.86.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.86.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.86.1-1: General test parameters for E-UTRAN TDD early out-of-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |

| | | | |
|---|---|---|---|
| DRX | | OFF | |
| Layer 3 filtering | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | ms | 1800 | T310 is enabled |
| T314 timer | ms | 0 | T314 is disabled |
| T311 timer | ms | 1000 | T311 is enabled |
| T1 | s | 2 | |
| T2 | s | 0.8 | |
| T3 | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.86.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | 5MHz: OP.10 TDD<br>10MHz: OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.6 | -22.6 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.86.1-1.
Note 7: Aggregation level and repetition levels specified in A.7.3.86.1-1 are used for this test.

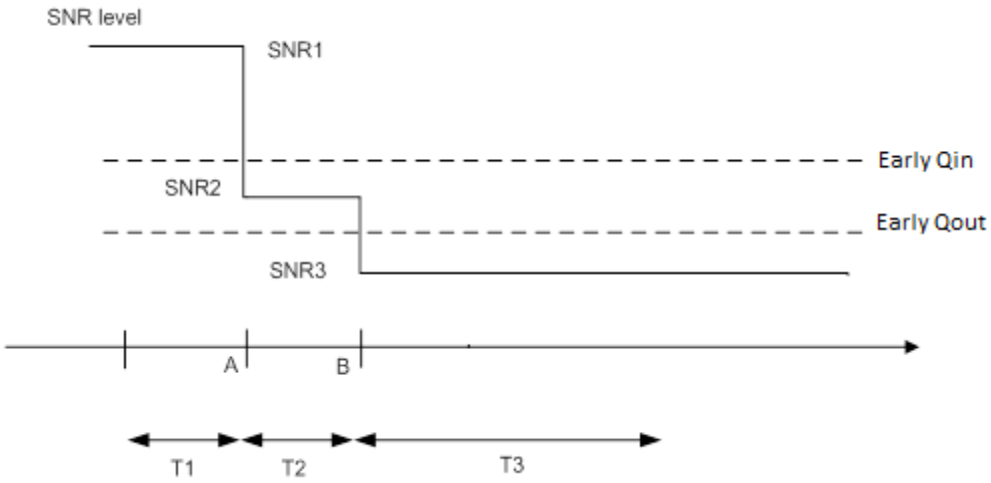


**Figure A.7.3.86.1-1: SNR variation for early out-of-sync testing**

### A.7.3.86.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.87 E-UTRAN TDD Early In-Sync reporting Test for Cat-M1 UE in CEModeB

### A.7.3.87.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects an early in sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.87.1-1 and A.7.3.87.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.87.1-1 shows the variation of the downlink SNR in the active cell to emulate early in-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.87.1-1: General test parameters for E-UTRAN TDD early in-sync testing for UE Cat-M1 in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early In sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early in-sync threshold $Q_{E2_in_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-2 respectively. |
| | M-PDCCH aggregation level | eCCE | 8 | |
| | M-PDCCH repetition level | | 16 | |

| | | | | |
|---|---|---|---|---|
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T315 | | ms | 0 | T315 is disabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.36 | |
| T4 | | s | 0.4 | |
| T5 | | s | 2 | |
| Note 1: MPDCCH corresponding to the early in-sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.87.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for early in-sync radio link monitoring tests for Cat-M1 in CEModeB**

| Parameter | Unit | Test 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| BWchannel | MHz | 5:<br>10 | | | | |
| Special subframe configuration Note 1 | | 6 | | | | |
| Uplink-downlink configuration Note 1 | | 1 | | | | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | | | | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | 5MHz: OP.10 TDD<br>10MHz: OP.11 TDD | | | | |
| $\rho_A$, $\rho_B$ | | -3 | | | | |
| MPDCCH_RA | dB | 0 | | | | |
| MPDCCH_RB | dB | 0 | | | | |
| PBCH_RA | dB | -3 | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | -7 | -16.6 | -22.6 | -15 | -7 |
| Propagation condition | | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.87.1-1.
Note 7: Aggregation level and repetition levels specified in A.7.3.87.1-1 are used for this test.

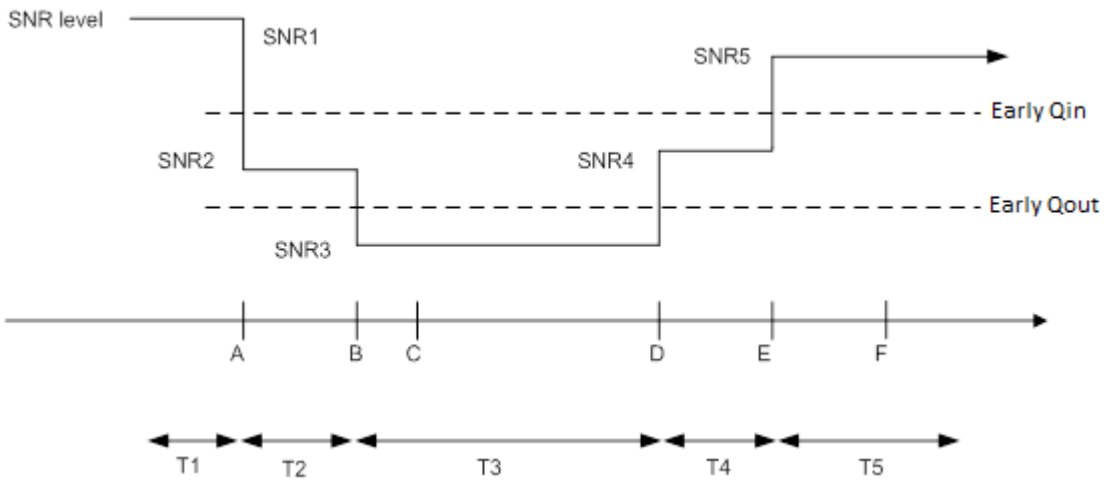


**Figure A.7.3.87.1-1: SNR variation for early in-sync testing**

### A.7.3.87.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{in_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E2_in_CatM1}$. When the estimated quality becomes better than the threshold starting from time point E, Layer 1 of the UE shall trigger event E2 and send a report to the higher layers within $Q_{in_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.88 TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage

### A.7.3.88.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.88.1-1, A.7.3.88.1-2, A.7.3.88.1-2A, A.7.3.88.1-3 and A.7.3.88.1-4. nCell 1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.88.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

  Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

  Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

  Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode the NPDCCH and complete the UL transmission when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.88.1-1: General test parameters for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | nCell 1 | |
| Neighbour cell | | eCell 1 | |
| CP length | | Normal | |
| Deployment Mode | | In-band | |
| NPDCCH transmission parameters $R_{max}$ | | 8 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| DRX cycle | ms | 256 | See Table A.7.3.88.1-3 |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 1000 | T311 is enabled |
| T1 | s | 5.12 | |
| dT | S | 0.8 | |
| T2 | s | 10.24 | |
| dT | S | 0.7 | |
| T3 | s | 5.12 | |
| dT | S | 1.4 | |
| T4 | s | 5.12 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331 [2].<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.88.1-2: nCell specific test parameters for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | | | |
| NPDCCH parameters as defined in A.3.1.5.7 | | R.15 NB-TDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.88.1-2A | | | | | | |
| SNR Note 4, 5 | dB | -3.1 | Note 6 | -9.1 | Note 6 | -14.1 | Note 6 | -3.1 |

| | | |
|---|---|---|
| Propagation condition | | AWGN |
| Configuration | | 2x1 |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.88.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

**Table A.7.3.88.1-2A: eCell 1 specific test parameters for TDD Out-of-sync radio link monitoring test in DRX for UE category NB1 In-band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.88.1-3: DRX-Configuration for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.7.3 in TS 36.331 [2] |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| drx-StartOffset | 0 | |

**Table A.7.3.88.1-4: *TimeAlignmentTimer* -Configuration for NB-IoT TDD out-of-sync testing for UE category NB1 In-band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

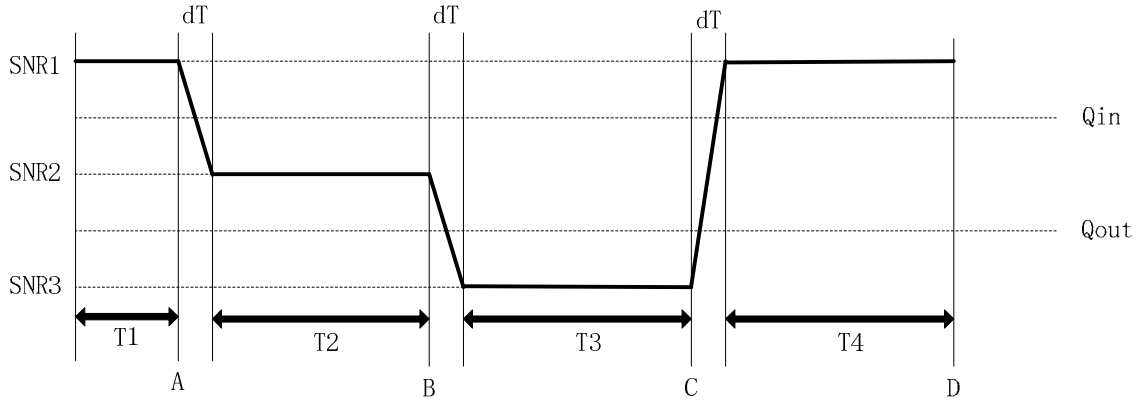


**Figure A.7.3.88.1-1: SNR variation for out-of-sync testing in DRX for NB-IoT TDD out-of-sync testing for UE category NB1 In-band mode in normal coverage**

### A.7.3.88.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.89 TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage

### A.7.3.89.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.89.1-1, A.7.3.89.1-2, A.7.3.89.1-2A, A.7.3.89.1-3 and A.7.3.89.1-4. nCell 1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.89.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

  Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

  Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode the NPDCCH and complete the UL transmission when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

**Table A.7.3.89.1-1: General test parameters for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | nCell 1 | |
| Neighbour cell | | eCell 1 | |
| CP length | | Normal | |
| Deployment Mode | | In-band | |
| NPDCCH transmission parameters $R_{max}$ | | 16 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16] |
| DRX cycle | ms | 256 | See Table A.7.3.61.1-3 |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 1000 | T311 is enabled |
| T1 | s | 5.12 | |
| dT | s | 0.7 | |
| T2 | s | 10.24 | |
| dT | s | 0.8 | |
| T3 | s | 5.12 | |
| dT | s | 1.4 | |
| T4 | s | 5.12 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331 [2].<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.89.1-2: nCell specific test parameters for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | | | |
| NPDCCH parameters as defined in A.3.1.5.7 | | R.15 NB-TDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.89.1-2A | | | | | | |
| SNR Note 4, 5 | dB | -6.3 | Note 6 | -11.4 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | | | |
| Antenna Configuration | | 2x1 | | | | | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.89.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

**Table A.7.3.89.1-2A: eCell 1 specific test parameters for TDD Out-of-sync radio link monitoring test in DRX for UE category NB1 In-band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.89.1-3: DRX-Configuration for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.7.3 in TS 36.331 [2] |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| drx-StartOffset | 0 | |

**Table A.7.3.89.1-4: *TimeAlignmentTimer* -Configuration for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

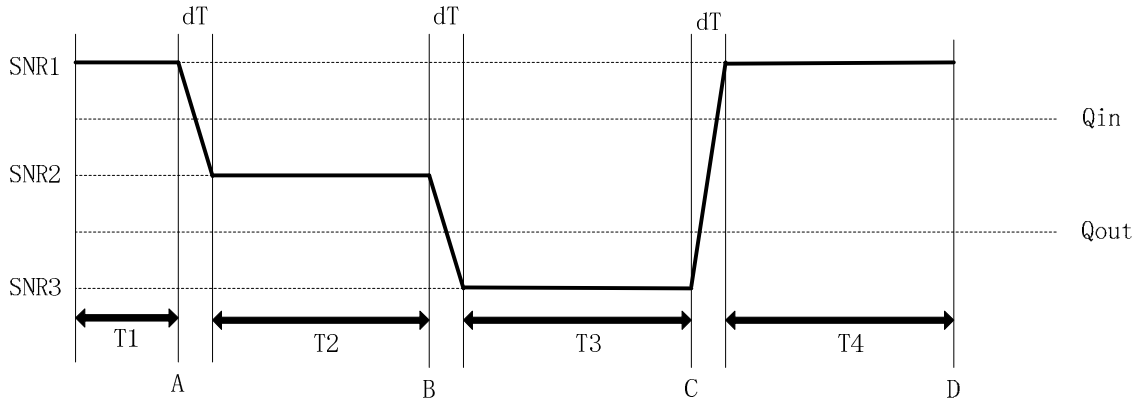


**Figure A.7.3.89.1-1: SNR variation for TDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category NB1 In-band mode in enhanced coverage**

### A.7.3.89.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4.

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.90 TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Normal Coverage

### A.7.3.90.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE configured in normal coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell when DRX is used. This test will partly verify the TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.90.1-1, A.7.3.90.1-2, A.7.3.90.1-3, A.7.3.90.1-4 and A.7.3.90.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.90.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2 and T3 are as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.

- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission.

- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. NPDCCH repetition level is determined by RRC parameter *npdcch-NumRepetitions* [2]. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.90.1-1: General test parameters for TDD in-sync test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 2 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 8 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 [16] |
| DRX cycle | | ms | 256 | See Table A.7.3.63.1-4 |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.90.1-2: nCell 1 specific test parameters for TDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 180 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| NPDCCH parameters defined in A.3.1.5.7 | | R.15 NB-TDD | | | | |
| Ratio of NPDSCH to NRS EPRE | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA[Note1] | dB | | | | | |
| NOCNG_RB[Note1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.90.1-3 | | | | |
| SNR [Note 5, Note 6] | dB | -3.1 | Note 7 | -14.1 | Note 8 | -3.1 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.90.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.90.1-3: eCell 1 specific test parameters for TDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA[Note 1] | dB | |
| OCNG_RB[Note 1] | dB | |
| $N_{oc}$ [Note2] | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |

Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

**Table A.7.3.90.1-4: DRX-Configuration for E-UTRAN TDD in-sync tests with DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.7.3.90.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD in-sync tests with DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

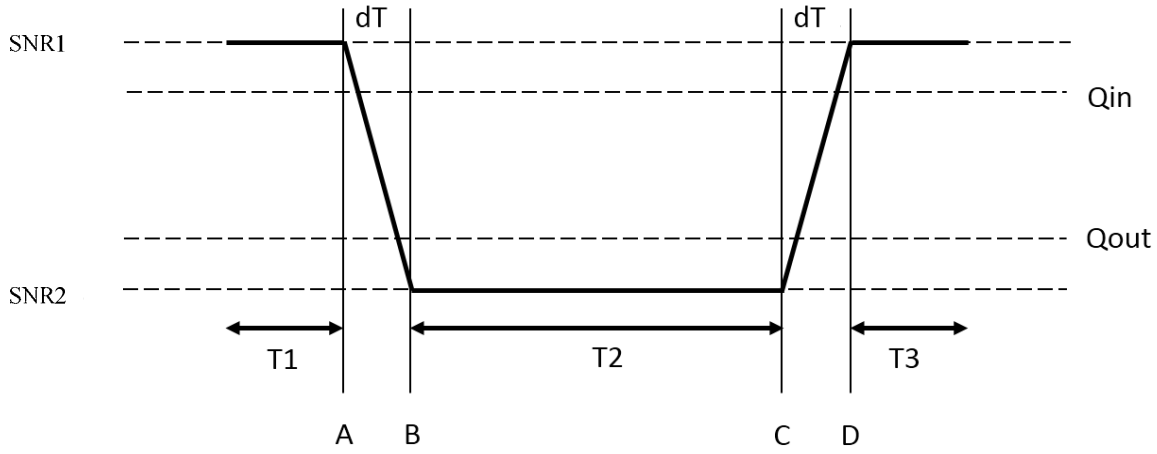


**Figure A.7.3.90.1-1: SNR variation for in-sync testing with DRX**

### A.7.3.90.2 Test Requirements

The UE behaviour in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.91 TDD Radio Link Monitoring Test for In-sync with DRX for UE Category NB1 In-Band mode in Enhanced Coverage

### A.7.3.91.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE configured in enhanced coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell when DRX is used. This test will partly verify the TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.91.1-1, A.7.3.91.1-2, A.7.3.91.1-3, A.7.3.91.1-4 and A.7.3.91.1-5. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.91.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2 and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. NPDCCH repetition level is determined by RRC parameter *npdcch-NumRepetitions* [3]. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.91.1-1: General test parameters for TDD in-sync test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 4 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 16 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 [16] |
| DRX cycle | | ms | 256 | See Table A.7.3.62.1-4 |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |

| | | | |
|---|---|---|---|
| dT | s | 1.4 | |
| T3 | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | |

**Table A.7.3.91.1-2: nCell 1 specific test parameters for TDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 180 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.5.7 | | R.15 NB-TDD | | | | |
| Ratio of NPDSCH to NRS EPRE | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA Note1 | dB | | | | | |
| NOCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.91.1-3 | | | | |
| SNR Note 5, Note 6 | dB | -6.3 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.91.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.91.1-3: eCell 1 specific test parameters for TDD in-sync radio link monitoring test with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |

| | | |
|---|---|---|
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | |

**Table A.7.3.91.1-4: DRX-Configuration for E-UTRAN TDD in-sync tests with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | pp1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | pp0 | |
| drx-RetransmissionTimer | pp0 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.7.3.91.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD in-sync tests with DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

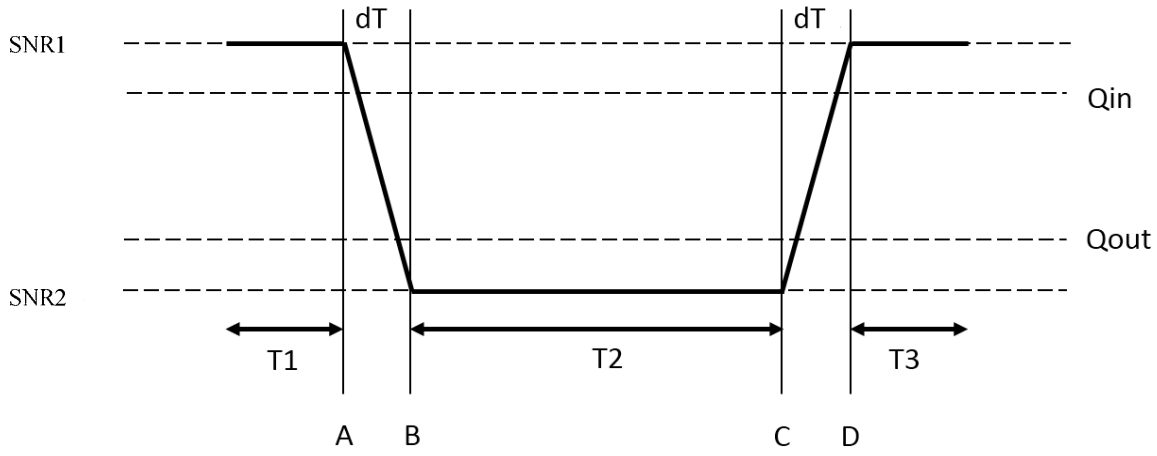


**Figure A.7.3.91.1-1: SNR variation for in-sync testing with DRX**

## A.7.3.91.2 Test Requirements

The UE behaviour in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.92 TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Normal Coverage

## A.7.3.92.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE configured in normal coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.92.1-1, A.7.3.92.1-2, A.7.3.92.1-3 and A.7.3.92.1-4. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.92.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is disabled, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2, dT and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.92.1-1: General test parameters for TDD in-sync test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 2 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 8 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |

| | | | | |
|---|---|---|---|---|
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 [16] |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.92.1-2: nCell 1 specific test parameters for TDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 200 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.5.7 | | R.15 NB-TDD | | | | |
| NPDSCH_RA | | -3 | | | | |
| NPDSCH_RB | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA[Note1] | dB | | | | | |
| NOCNG_RB[Note1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.92.1-3 | | | | |
| SNR [Note 5, Note 6] | dB | -3.1 | Note 7 | -14.1 | Note 8 | -3.1 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.92.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.92.1-3: eCell 1 specific test parameters for TDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in normal coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |

| | | |
|---|---|---|
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 6 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | |

**Table A.7.3.92.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD in-sync tests without DRX for UE category NB1 In-Band mode in normal coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

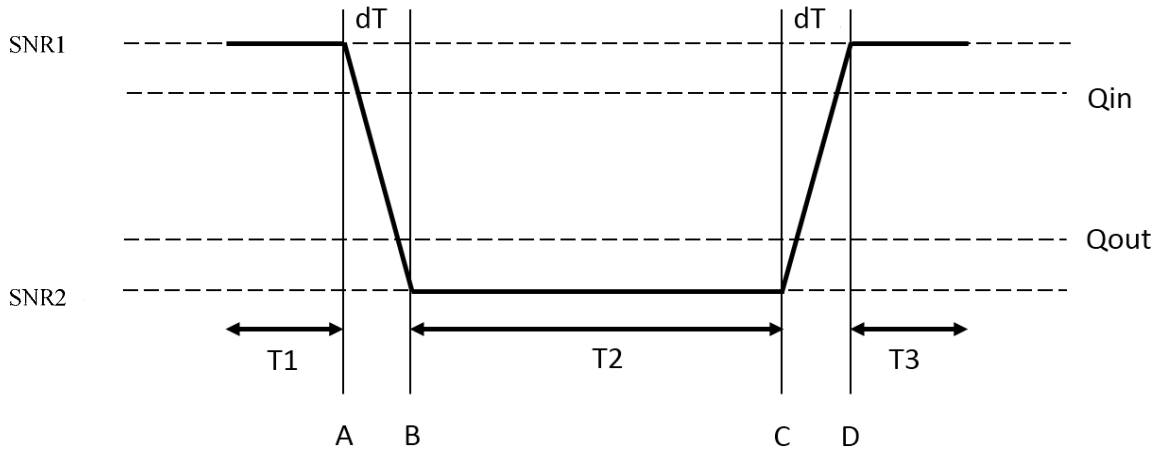


**Figure A.7.3.92.1-1: SNR variation for in-sync testing without DRX**

## A.7.3.92.2 Test Requirements

The UE behavior in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.93 TDD Radio Link Monitoring Test for In-sync without DRX for UE Category NB1 In-Band mode in Enhanced Coverage

## A.7.3.93.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE configured in enhanced coverage properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.93.1-1, A.7.3.93.1-2, A.7.3.93.1-3 and A.7.3.93.1-4. nCell 1 is the active cell in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.93.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states.

Prior to the start of the time duration T1, the UE shall be fully be synchronized to nCell 1. The UE is scheduled in every uplink subframe to transmit NPUSCH, which is received by the test equipment. By measuring the reception of the NPUSCH, detection of out of sync and in sync requirements can be measured. In the test, DRX configuration is disabled, i.e. UE tries to decode NPDCCH and to send NPUSCH during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

The test setup in each test during time durations T1, T2, dT and T3 shall be as follows:

- During the period from time point A to time point B, the SNR is decreasing linearly from SNR1 to SNR2.
- During the period from time point C to time point D, the SNR is increasing linearly from SNR2 to SNR3.
- During the period T3, the test system shall send the UE a grant to transmit in uplink. UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission.
- Thereafter UE switches back to downlink.

In each run of the test, the test equipment selects NPDCCH repetition level, and sends the RRC configuration to the UE. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.93.1-1: General test parameters for TDD in-sync test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| NB-IoT operational mode | | | In-band | |
| Active cell | | | nCell 1 | NB-IOT cell nCell1 is within E-UTRA cell eCell1 |
| CP length | | | Normal | |
| In sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | In sync threshold $Q_{in_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 4 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |
| | Ratio of NPDCCH to NRS EPRE | | 0 | |
| Out of sync transmission parameters (Note 1) | DCI format | | Format N1 | As defined in TS 36.212 [21] |
| | Number of OFDM symbols for legacy control channels | | 3 | Out of sync threshold $Q_{out_NB\text{-}IoT}$ and the corresponding hypothetical NPDCCH transmission parameters are as specified in clause 7.23.2 and Table 7.23.2-1 respectively. |
| | NPDCCH aggregation level | eCCE | 2 | |
| | NPDCCH repetition level | | 16 | |
| | Ratio of NPDSCH to NRS EPRE | | 0 | |

| | | | | |
|---|---|---|---|---|
| | Ratio of NPDCCH to RS EPRE | dB | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-1 in TS 36.211 [16] |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 4000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 4 | |
| dT | | s | 1.4 | |
| T2 | | s | 2.12 | |
| dT | | s | 1.4 | |
| T3 | | s | 4 | |
| Note 1: NPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.93.1-2: nCell 1 specific test parameters for TDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 |
| $BW_{channel}$ | kHz | 200 | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 30 | | | | |
| NPDCCH parameters defined in A.3.1.5.7 | | R.15 NB-TDD | | | | |
| NPDSCH_RA | | -3 | | | | |
| NPDSCH_RB | | -3 | | | | |
| NPDCCH_RA | dB | -3 | | | | |
| NPDCCH_RB | dB | -3 | | | | |
| NPBCH_RA | dB | -3 | | | | |
| NPBCH_RB | dB | | | | | |
| NPSS_RA | dB | | | | | |
| NSSS_RA | dB | | | | | |
| NOCNG_RA[Note1] | dB | | | | | |
| NOCNG_RB[Note1] | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | Specified in Table A.7.3.93.1-3 | | | | |
| SNR [Note 5, Note 6] | dB | -6.3 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation condition | | AWGN | | | | |
| Antenna Configuration | | 2x1 | | | | |

Note 1: OCNG shall be used such that the resources in ncell1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains NPDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2, and SNR1 respectively in figure A.7.3.93.1-1.
Note 7: The Test system shall reduce its transmit power in steps of (((SNR2-SNR1) / (10*dT)) dB every 100ms till SNR2 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of (((SNR1-SNR2) / (10*dT)) dB every 100ms till SNR1 is achieved at the end of dT.

**Table A.7.3.93.1-3: eCell 1 specific test parameters for TDD in-sync radio link monitoring test without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T3 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.1 TDD |

| | | |
|---|---|---|
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | |

**Table A.7.3.93.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD in-sync tests without DRX for UE category NB1 In-Band mode in enhanced coverage**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 [2] |

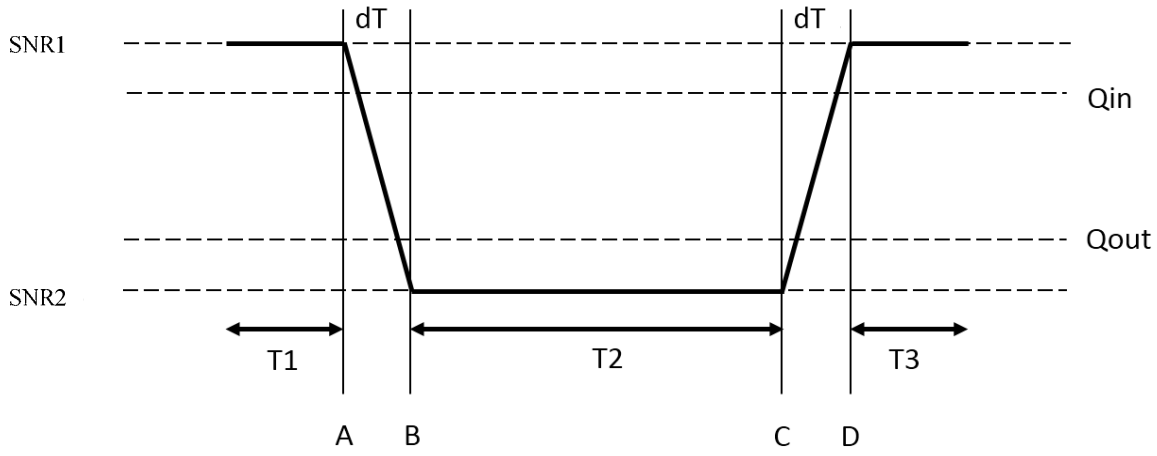


**Figure A.7.3.93.1-1: SNR variation for in-sync testing without DRX**

## A.7.3.93.2 Test Requirements

The UE behavior in each test shall be as follows:

During the period T3, the UE under test is expected to decode the uplink grant and switch to uplink and complete the uplink transmission. This is considered a correct event.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.94 TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 Standalone mode in Normal Coverage

## A.7.3.94.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.94.1-1 and A.7.3.94.1-2. nCell1 is the active NB-IoT cell in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.94.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure:

- Prior to the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 within dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH

Note: The UE is expected to decode the NPDCCH and complete the UL transmission during T2 according to the UL grant.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 within dT
- During T3, the SNR is kept as SNR3

Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

Note: The UE is not expected to decode the UL grant and conduct any UL transmission during T4, since the UE is expected to declare RLF during T3.

**Table A.7.3.94.1-1: General test parameters for TDD Radio Link Monitoring Test for out-of-sync tests without DRX for UE Category NB1 Standalone mode in normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | **Standalone** | |
| Active cell | | nCell 1 | |
| CP length | | Normal | |
| NPDCCH repetition level $R_{max}$ | | 8 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-1 in TS 36.211 [16] |
| DRX | | OFF | |
| Layer 3 filtering Note 2,3 | | Enabled | Counters:<br>N310 = 1<br>N311 = 1 |
| T310 timer Note 2,3 | ms | 0 | T310 is disabled |
| T311 timer Note 2,3 | ms | 3000 | T311 is enabled |
| T1 | s | 2 | |
| dT | s | 0.8 | |
| T2 | s | 0.4 | |
| dT | s | 0.7 | |
| T3 | s | 0.5 | |
| dT | s | 1.4 | |

| | | | |
|---|---|---|---|
| T4 | s | 0.4 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331 [2].<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.94.1-2: nCell1 specific test parameters for TDD Radio Link Monitoring Test for out-of-sync without DRX for UE Category NB1 Standalone mode in normal coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| NB-IoT Channel Bandwidth ($BW_{channel}$) | kHz | 180 | | | | | | |
| OCNG Pattern as defined in A.3.2.3.8 Note 1 | | NOP.3 TDD | | | | | | |
| NPDCCH parameters as defined in A.3.1.5.8 | | R.19 NB-TDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 KHz | -98 | | | | | | |
| SNR Note 4,5 | - | -3.1 | Note 6 | -9.1 | Note 7 | -14.1 | Note 6 | -3.1 |
| Propagation Condition | - | AWGN | | | | | | |
| Antenna Configuration | - | 2x1 | | | | | | |

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2: Void
Note 3: Void
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNRs in time periods T1, T2, T3 and T4 are denoted as SNR2, SNR3 and SNR1 respectively in figure A.7.3.94.1-1.
Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.
Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT.
Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT.

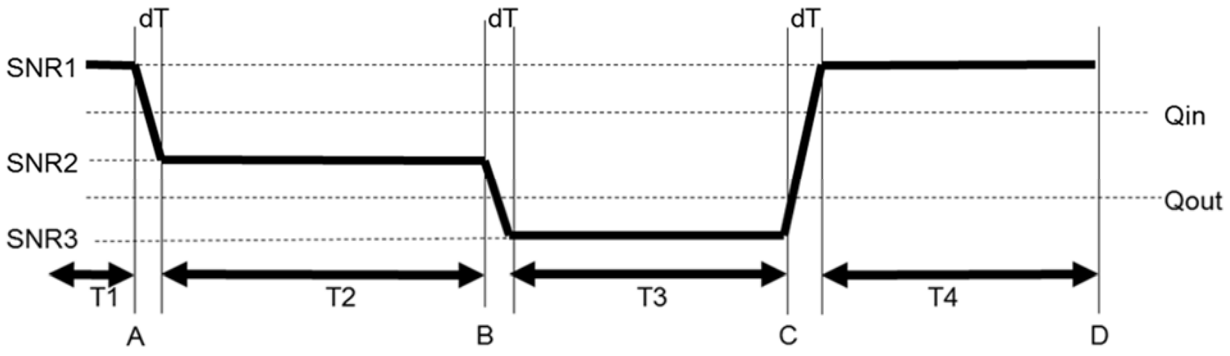


**Figure A.7.3.94.1-1: SNR variation for out-of-sync testing**

### A.7.3.94.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behaves correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

## A.7.3.95 TDD Radio Link Monitoring Test for Out-of-sync without DRX for UE Category NB1 guard band mode in Enhanced Coverage

### A.7.3.95.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD category NB1 UE properly detects the out of sync for the purpose of monitoring downlink radio link quality of the NB-IoT Cell. This test will partly verify the NB-IoT TDD radio link monitoring requirements in clause 7.23.

The test parameters are given in Tables A.7.3.95.1-1 and A.7.3.95.1-2 below. nCell1 is the active NB-IoT cell, in the test. The test consists of four successive time periods with time duration of T1, T2, T3 and T4 respectively, excluding the transition time duration dT, where the SNR increases or decreases gradually in small steps. Figure A.7.3.95.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync state with the following testing procedure.

- Before the start of the time duration T1, the UE shall be fully synchronized to nCell1
- Starting at point A, the SNR is decreased in small steps from SNR1 to SNR2 with duration dT
- At the start of the time duration T2, the UE is provided with a UL grant with NPDCCH.

Note: The UE is expected to decode NPDCCH and complete the UL transmission during T2 according to the UL grant.

- Starting at point B, the SNR is decreased in small steps from SNR2 to SNR3 with duration dT
- During T3, the SNR is kept at SNR3.

Note: The UE is expected to detect OOS and declare RLF during T3.

- Starting at point C, the SNR is increased in small steps from SNR3 to SNR1 with duration dT
- At the start of the time period T4, the UE will be provided with another UL grant with NPDCCH

Note: The UE is not expected to decode the UL grant and conduct the UL transmission during T4 since the UE is expected to declare RLF during T3.

**Table A.7.3.95.1-1: General test parameters for TDD Radio Link Monitoring Test for out-of-sync tests without DRX for UE Category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Guardband | |
| Active cell | | nCell 1 | |
| CP length | | Normal | |
| NB-IoT RF Channel Number | | 1 | One NB-IoT carrier frequency |
| NPDCCH repetition level $R_{max}$ | | 16 | Other NPDCCH parameters are defined in " out-of-sync" column in Table 7.23.2-1 |

| | | | |
|---|---|---|---|
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| DRX | | OFF | |
| Layer 3 filtering Note 2 | | Enabled | Counters: N310 = 1 N311 = 1 |
| T310 timer Note 2 | ms | 0 | T310 is disabled |
| T311 timer Note 2 | ms | 3000 | T311 is enabled |
| T1 | s | 2 | |
| dT | s | 0.7 | |
| T2 | s | 0.4 | |
| dT | s | 0.8 | |
| T3 | s | 0.5 | |
| dT | s | 1.4 | |
| T4 | s | 0.4 | |
| Note 1: NPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel.<br>Note 2: N310, N311, T310 and T311 are defined in TS 36.331 [2].<br>Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. | | | |

**Table A.7.3.95.1-2: nCell1 specific test parameters for TDD Radio Link Monitoring Test for out-of-sync without DRX for UE Category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | nCell 1 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | T1 | dT | T2 | dT | T3 | dT | T4 |
| $BW_{channel}$ | kHz | 180 | | | | | | |
| PRB location within eCell | - | eCell 1 $BW_{channel}$ 10MHz: 50 | | | | | | |
| NPDCCH parameters as defined in A.3.1.5.9 | | R.23 NB-TDD | | | | | | |
| NPBCH_RA | dB | -3 | | | | | | |
| NPBCH_RB | dB | | | | | | | |
| NPSS_RA | dB | | | | | | | |
| NSSS_RA | dB | | | | | | | |
| NPDCCH_RA | dB | | | | | | | |
| NPDCCH_RB | dB | | | | | | | |
| NPDSCH_RA | dB | | | | | | | |
| NPDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ | dBm/15 KHz | Specified in Table A.7.3.95.1-3 | | | | | | |
| SNR Note 4,5 | - | -6.3 | Note 6 | -11.4 | Note 7 | -17.4 | Note 8 | -6.3 |
| Propagation Condition | - | AWGN | | | | | | |
| Antenna Configuration | - | 2x1 | | | | | | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.<br>Note 2: Void<br>Note 3: Void<br>Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 5: The SNR in time periods T1, T2, T3 and T4 is denoted as SNR1, SNR2, SNR3 and SNR1 respectively in figure A.7.3.95.1-1.<br>Note 6: The Test system shall reduce its transmit power in steps of ((SNR2-SNR1) / (10*dT)) dB every 100ms until SNR2 is achieved at the end of dT.<br>Note 7: The Test system shall reduce its transmit power in steps of ((SNR3-SNR2) / (10*dT)) dB every 100ms until SNR3 is achieved at the end of dT. | | | | | | | | |

| |
|---|
| Note 8: The Test system shall increase its transmit power in steps of ((SNR1-SNR3) / (10*dT)) dB every 100ms until SNR1 is achieved at the end of dT. |

**Table A.7.3.95.1-3: eCell 1 specific test parameters for TDD out-of-sync radio link monitoring test without DRX for UE category NB1 Guard band mode in enhanced coverage**

| Parameter | Unit | eCell 1 |
|---|---|---|
| | | T1-T4 |
| $BW_{channel}$ | MHz | 10 |
| NOCNG Pattern | - | $BW_{channel}$ 10MHz: NOP.2 TDD |
| PBCH_RA | dB | -3 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation Condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Note 1: OCNG shall be used such that the eCell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | |

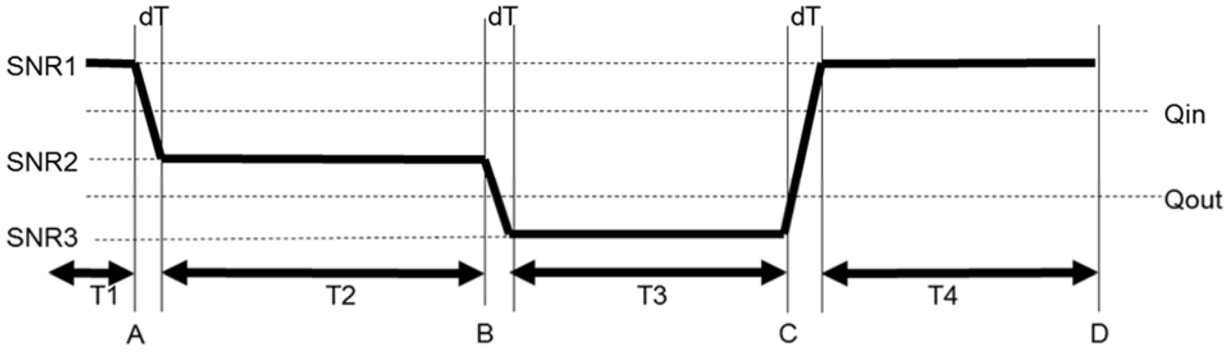


**Figure A.7.3.95.1-1: SNR variation for out-of-sync testing**

## A.7.3.95.2 Test Requirements

The UE behaviors in each test shall be as follows:

- The UE shall complete the NPUSCH transmission during T2 according to the received UL grant;
- The UE shall not conduct any NPUSCH transmission during T4

A correct event is defined as UE behave correctly in all above steps. The correct events observed during repeated tests shall be at least 90%.

# A.7.3.96 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A for MPDCCH performance improvement

## A.7.3.96.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA configured with *mpdcch-crs-connnected-config*. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.96.1-1 and A.7.3.96.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.96.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.96.1-1: General test parameters for E-UTRAN FD-FDD out-of-sync testing for UE Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-3 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.96.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | Unit | Test 1 |
|---|---|---|

| | | T1 | T2 | T3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.1 | -7.0 | -16.0 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.96.1-1.

# A.7.3.97 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A for MPDCCH performance improvement

## A.7.3.97.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA configured with *mpdcch-crs-connnected-config*. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.97.1-1 and A.7.3.97.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.97.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 20 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the *RRC parameter mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.97.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync testing for UE Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-3 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH transmission parameters corresponding to the in-sync and out of sync transmission need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.97.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.7 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.1 | -7.0 | -16.0 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1. |
| Note 3: | The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. |
| Note 4: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 5: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 6: | The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.97.1-1. |

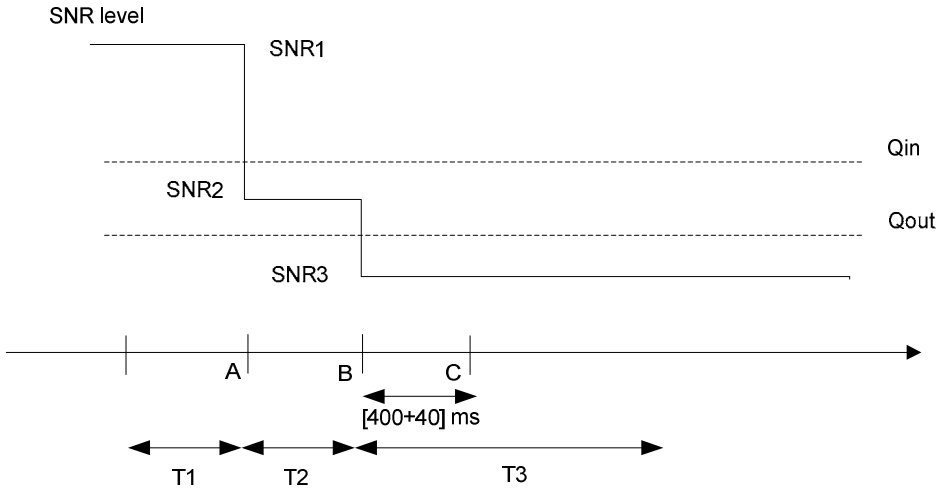


**Figure A.7.3.97.1-1: SNR variation for out-of-sync testing**

### A.7.3.97.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.3.98 E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A for MPDCCH performance improvement

### A.7.3.98.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell in CEModeA configured with *mpdcch-crs-connnected-config*. This test will partly verify the E-UTRAN TDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.98.1-1 and A.7.3.98.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.98.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 1 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.98.1-1: General test parameters for E-UTRAN TDD out-of-sync testing for UE Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Out of sync transmission parameters (Note 1) | DCI format | | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Out of sync threshold $Q_{out}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-3 respectively. |
| | M-PDCCH aggregation level | eCCE | 24 | |
| | M-PDCCH repetition level | | 8 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters: N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 1 | Minimum CQI reporting periodicity |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.98.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A for MPDCCH performance improvement**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.15 TDD Note 8 | | |
| OCNG Pattern defined in A.3.2.2.11 (TDD) | | OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| PBCH_RA | dB | | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RA Note 1 | dB | -3 | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 7 | dB | -0.3 | -7.3 | -16.3 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.
Note 4: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 5: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 6: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 7: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.98.1-1.
Note 8: Aggregation level and repetition levels specified in A.7.3.98.1-1 are used for this test.

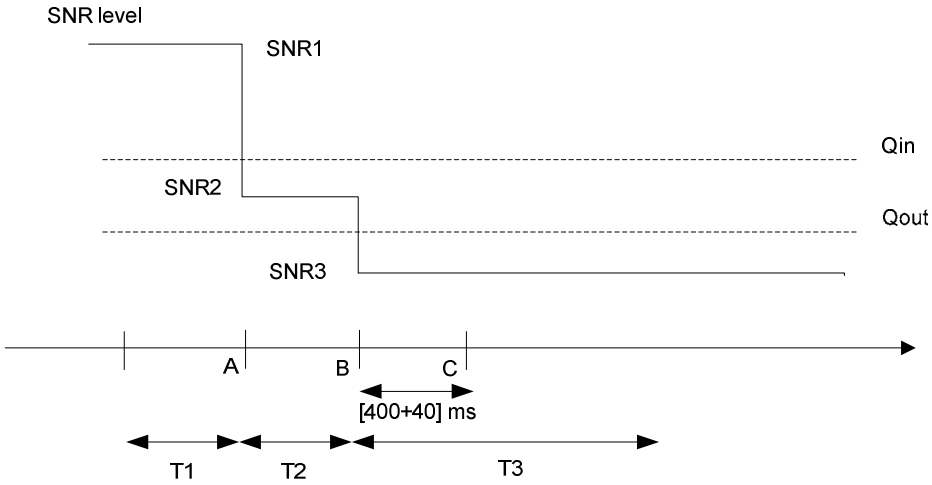


**Figure A.7.3.98.1-1: SNR variation for out-of-sync testing**

## A.7.3.98.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.99 E-UTRAN FD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB for MPDCCH performance improvement

## A.7.3.99.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB configured with *mpdcch-crs-connnected-config*. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.99.1-1 and A.7.3.99.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.99.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.99.1-1: General test parameters for E-UTRAN FD-FDD early out-of-sync testing for UE Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-4 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 1800 | T310 is enabled |
| T314 timer | | ms | 0 | T314 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.82.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | | |
| OCNG Pattern defined in A.3.2.1.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |

| | | | | |
|---|---|---|---|---|
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.8 | -22.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 3: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.99.1-1.

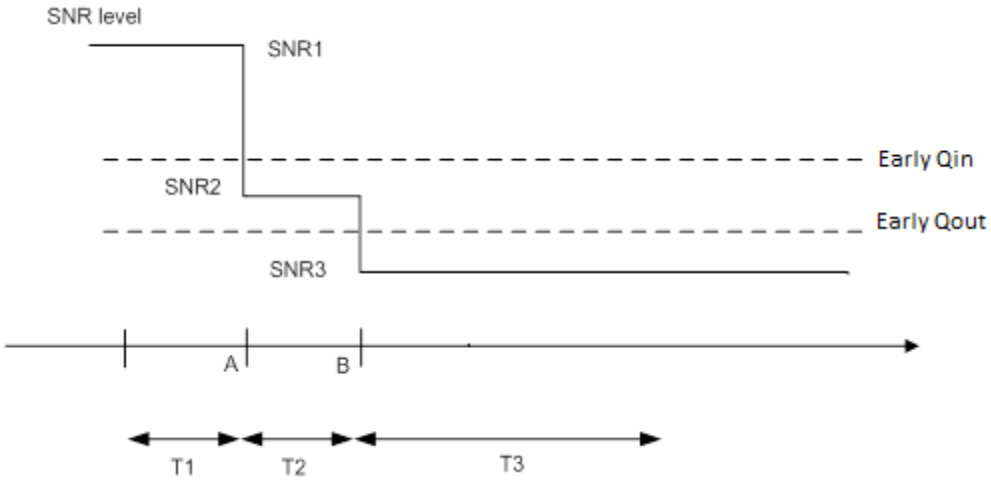


**Figure A.7.3.99.1-1: SNR variation for early out-of-sync testing**

## A.7.3.99.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period#

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.100 E-UTRAN HD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB for MPDCCH performance improvement

## A.7.3.100.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB configured with *mpdcch-crs-connnected-config*. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.100.1-1 and A.7.3.100.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.100.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.100.1-1: General test parameters for E-UTRAN HD-FDD early out-of-sync testing for UE Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-4 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 1800 | T310 is enabled |
| T314 timer | | ms | 0 | T314 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.100.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) | | 5MHz: OP.22 FDD<br>10MHz: OP.21 FDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |

| | | | | |
|---|---|---|---|---|
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.8 | -22.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 3: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 4: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 5: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.100.1-1.

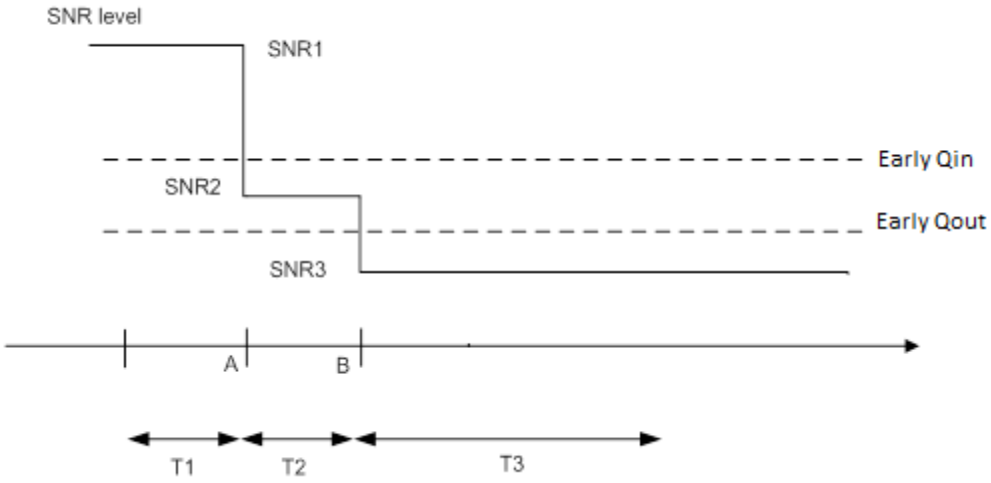


**Figure A.7.3.100.1-1: SNR variation for early out-of-sync testing**

## A.7.3.100.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.3.101 E-UTRAN TDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeB for MPDCCH performance improvement

## A.7.3.101.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD Cat-M1 UE properly detects an early out of sync event and makes correct reporting of it for the purpose of monitoring the downlink radio link quality of the PCell in CEModeB configured with *mpdcch-crs-connnected-config.* This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19.

The test parameters are given in Tables A.7.3.101.1-1 and A.7.3.101.1-2 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.3.101.1-1 shows the variation of the downlink SNR in the active cell to emulate early out-of-sync and early in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 128. In addition, the UE is configured with *rlm-ReportConfig*. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

**Table A.7.3.101.1-1: General test parameters for E-UTRAN TDD early out-of-sync testing for UE Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | | | Normal | |
| Early Out of sync transmission parameters (Note 1) | DCI format | | 6-1B | As defined in section 5.3.3.1.12 in TS 36.212 |
| | Number of OFDM symbols for legacy control channels | | 2 | Early Out of sync threshold $Q_{E1_out_CatM1}$ and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.4 and Table 7.19.4-4 respectively. |
| | M-PDCCH aggregation level | eCCE | 16 | |
| | M-PDCCH repetition level | | 64 | |
| | $\rho_A$, $\rho_B$ | | -3 | |
| DRX | | | OFF | |
| Layer 3 filtering | | | Enabled | Counters:<br>N310 = 1; N311 = 1 |
| T310 timer | | ms | 1800 | T310 is enabled |
| T314 timer | | ms | 0 | T314 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| T1 | | s | 2 | |
| T2 | | s | 0.8 | |
| T3 | | s | 1.8 | |
| Note 1: MPDCCH corresponding to the early out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

**Table A.7.3.101.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for early out-of-sync radio link monitoring tests for Cat-M1 in CEModeB for MPDCCH performance improvement**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5:<br>10 | | |
| Special subframe configuration Note 1 | | 6 | | |
| Uplink-downlink configuration Note 1 | | 1 | | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | | |

| | | | | |
|---|---|---|---|---|
| OCNG Pattern defined in A.3.2.2 (TDD) | | 5MHz: OP.10 TDD<br>10MHz: OP.11 TDD | | |
| $\rho_A$, $\rho_B$ | | -3 | | |
| MPDCCH_RA | dB | 0 | | |
| MPDCCH_RB | dB | 0 | | |
| PBCH_RA | dB | -3 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | | |
| SNR Note 5 | dB | -10 | -16.8 | -22.8 |
| Propagation condition | | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 4: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.3.101.1-1.
Note 7: Aggregation level and repetition levels specified in A.7.3.101.1-1 are used for this test.

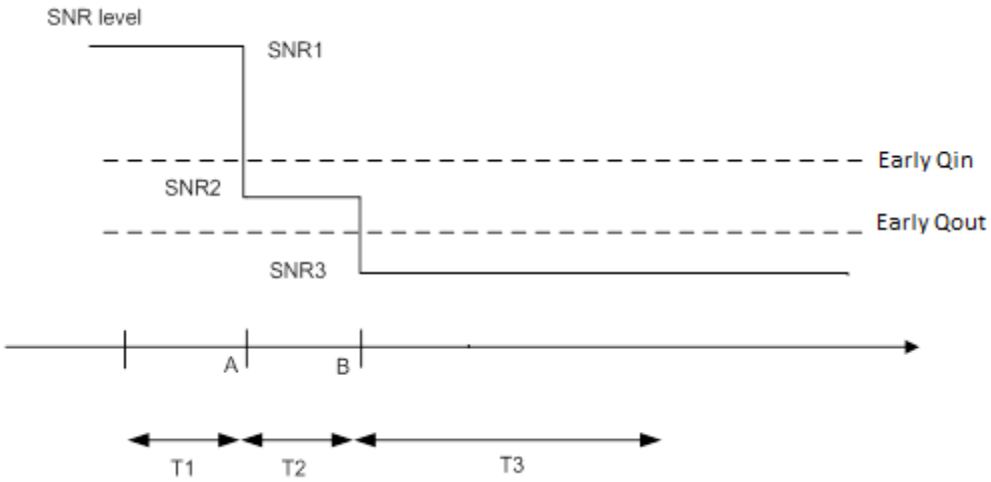


**Figure A.7.3.101.1-1: SNR variation for early out-of-sync testing**

## A.7.3.101.2 Test Requirements

The UE shall compare the downlink radio link quality of the PCell over the last $Q_{out_CatM1}$ evaluation, which is defined in 7.19.4.1, with the threshold $Q_{E1_out_CatM}$. When the estimated quality becomes worse than the threshold starting from time point B, Layer 1 of the UE shall trigger event E1 and send a report to the higher layers within $Q_{out_CatM1}$ evaluation period.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.4 Interruption for Dual Connectivity

## A.7.4.1 E-UTRAN FDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC

### A.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when PCell is in non-DRX and PSCell is in DRX, PCell interruptions due to transitions from active to non-active and from non-active to active during PSCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for FDD PCell in dual connectivity requirements in clause 7.12.2.

The test parameters are given in Table A.7.4.1.1-1, A.7.4.1.1-2 and A.7.4.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. PCell is continuously scheduled in DL while PSCell is not scheduled and has DRX configured. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as PCell and Cell2 shall be configured as PSCell. Prior to start of T1 the DRX inactivity timer for the PSCell have already expired. During T1 the UE shall be continuously scheduled on PCell while not scheduled on PSCell.

**Table A.7.4.1.1-1: General test parameters for E-UTRAN FDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | OFF | |
| T1 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is only required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.4.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Cell1 | Cell2 |
|---|---|---|---|
| | | T1 | T1 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |

| | | | |
|---|---|---|---|
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | 19 |
| $\hat{E}_s / I_{ot}$ | dB | 19 | 19 |
| RSRP Note 3 | dBm/15 KHz | -82 | -82 |
| SCH_RP Note 3 | dBm/15 KHz | -82 | -82 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Time offset to cell1 Note 4 | µs | - | 33 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.4.1.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer Note 1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf160 | |
| shortDRX | disable | disable | |

Note 1: UE is continuously scheduled in PCell

## A.7.4.1.2 Test Requirements

The UE shall be continuously scheduled in PCell during the entire length of T1. UE shall not be scheduled in PSCell during T1. During the time duration T1 the UE shall transmit at leat 99% of ACK/NACK on PCell.

The UE shall not miss transmitting two consequtive ACK/NACK.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.4.2 E-UTRAN TDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC

### A.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that when PCell is in non-DRX and PSCell is in DRX, PCell interruptions due to transitions from active to non-active and from non-active to active during PSCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for TDD PCell in dual connectivity requirements in clause 7.12.2.

The test parameters are given in Table A.7.4.2.1-1, A.7.4.2.1-2 and A.7.4.2.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. PCell is continuously scheduled in DL while PSCell is not scheduled and has DRX configured. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as PCell and Cell2 shall be configured as PSCell. Prior to start of T1 the DRX inactivity timer for the PSCell have already expired. During T1 the UE shall be continuously scheduled on PCell while not scheduled on PSCell.

**Table A.7.4.2.1-1: General test parameters for E-UTRAN TDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-1 in TS 36.211. Applicable to Cell1 |
| CP length | | Normal | As specified in table 4.2-2 in TS 36.211. Applicable to Cell1 |
| DRX | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | OFF | |
| T1 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is only required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.4.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Cell1 | Cell2 |
|---|---|---|---|
| | | T1 | T1 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |

| | | | |
|---|---|---|---|
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | 19 |
| $\hat{E}_s / I_{ot}$ | dB | 19 | 19 |
| RSRP Note 3 | dBm/15 KHz | -82 | -82 |
| SCH_RP Note 3 | dBm/15 KHz | -82 | -82 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Time offset to cell1 Note 4 | µs | - | 33 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.4.2.1-3: DRX-Configuration for E-UTRAN TDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer Note 1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf160 | |
| shortDRX | disable | disable | |

Note 1: UE is continuously scheduled in PCell

## A.7.4.2.2 Test Requirements

The UE shall be continuously scheduled in PCell during the entire length of T1. UE shall not be scheduled in PSCell during T1. During the time duration T1 the UE shall transmit at leat 99% of ACK/NACK on PCell.

The UE shall not miss transmitting two consequtive ACK/NACK.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.4.3 E-UTRAN FDD-FDD Interruption at transitions between active and non-active during DRX in asynchronous dual connectivity

### A.7.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE fulfils the requirement on interruptions on PCell at transitions between active and non-active during DRX in TS36.133 section 7.12.2.

The test parameters are given in Table A.7.4.3.1-1, Table A.7.4.3.1-2and Table A.7.4.3.1-3 below. In the test there are two cells: Cell 1 and Cell 2. Cell 1 is PCell on the FDD primary component (RF channel 1). Cell 2 is PSCell on the FDD secondary component (RF channel 2). The test consists of 1 time period, with time duration of T1. PDCCH indicating a new transmission on PCell shall be sent continuously during the whole time duration to ensure UE would not enter DRX state on PCell. PSCell is in DRX state with 320ms DRX cycle.

**Table A.7.4.3.1-1: General test parameters for E-UTRAN FDD-FDD Interruption at transitions between active and non-active during DRX in asynchronous dual connectivity**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active Cell | | Cell 1, Cell 2 | Cell 1 is PCell on E-UTRA RF channel number 1, and cell 2 is PSCell on E-UTRA RF channel number 2 |
| CP length | | Normal | |
| DRX on Cell1 | | OFF | |
| DRX on Cell2 | ms | 320 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| Note 1: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.4.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Interruption at transitions between active and non-active during DRX in asynchronous dual connectivity**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| | | T1 | T1 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 | 5: $N_{RB,c}$ = 25<br>10: $N_{RB,c}$ = 50<br>20: $N_{RB,c}$ = 100 |
| PDSCH parameters | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |

| | | | |
|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | 19 |
| $\hat{E}_s / I_{ot}$ | dB | 19 | 19 |
| RSRP Note 3 | dBm/15 KHz | -82 | -82 |
| SCH_RP Note 3 | dBm/15 KHz | -82 | -82 |
| Io Note 3 | dBm/Ch BW | -54.16+10log ($N_{RB,c}$ /50) | -54.16+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Receive timing offset to Cell1 Note 4 | μs | - | 500 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.4.3.1-3: DRX-Configuration for E-UTRAN FDD-FDD Interruption at transitions between active and non-active during DRX in asynchronous dual connectivity**

| Field | PSCell | Comment |
|---|---|---|
| | Value | |
| onDurationTimer | psf1 | |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

**Table A.7.4.3.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD Interruption at transitions between active and non-active during DRX in asynchronous dual connectivity**

| Field | PSCell | Comment |
|---|---|---|
| | Value | |
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.7.4.3.2 Test Requirements

The UE shall be scheduled on PCell continuously during the whole time duration T1. During time durations T1, at least 99% of all expected ACK/NACKs shall be transmitted on PCell by the UE.

Each interruption shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.4.4 E-UTRAN FDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC

### A.7.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that when PCell is in non-DRX and PSCell is in DRX, PCell interruptions due to transitions from active to non-active and from non-active to active during PSCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for FDD PCell in dual connectivity requirements in clause 7.12.2.

The test parameters are given in Table A.7.4.4.1-1, A.7.4.4.1-2 and A.7.4.4.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. PCell is continuously scheduled in DL while PSCell is not scheduled and has DRX configured. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as PCell and Cell2 shall be configured as PSCell. Prior to start of T1 the DRX inactivity timer for the PSCell have already expired. During T1 the UE shall be continuously scheduled on PCell while not scheduled on PSCell.

**Table A.7.4.4.1-1: General test parameters for E-UTRAN FDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | OFF | |
| T1 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is only required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.4.4.1-2: Cell specific test parameters for E-UTRAN FDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Cell1 | Cell2 |
|---|---|---|---|
| | | T1 | T1 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| Special subframe configuration | | Not applicable | 6 |
| Uplink-downlink configuration | | Not applicable | 1 |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |

| | | | |
|---|---|---|---|
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | 19 |
| $\hat{E}_s / I_{ot}$ | dB | 19 | 19 |
| RSRP Note 3 | dBm/15 KHz | -82 | -82 |
| SCH_RP Note 3 | dBm/15 KHz | -82 | -82 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Time offset to cell1 Note 4 | µs | - | 33 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.4.4.1-3: DRX-Configuration for E-UTRAN FDD-TDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer Note 1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf160 | |
| shortDRX | disable | disable | |

Note 1: UE is continuously scheduled in PCell

## A.7.4.4.2 Test Requirements

The UE shall be continuously scheduled in PCell during the entire length of T1. UE shall not be scheduled in PSCell during T1. During the time duration T1 the UE shall transmit at leat 99% of ACK/NACK on PCell.

The UE shall not miss transmitting two consequtive ACK/NACK.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.4.5 E-UTRAN TDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC

### A.7.4.5.1 Test Purpose and Environment

The purpose of this test is to verify that when PCell is in non-DRX and PSCell is in DRX, PCell interruptions due to transitions from active to non-active and from non-active to active during PSCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for TDD PCell in dual connectivity requirements in clause 7.12.2.

The test parameters are given in Table A.7.4.5.1-1, A.7.4.5.1-2 and A.7.4.5.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. PCell is continuously scheduled in DL while PSCell is not scheduled and has DRX configured. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as PCell and Cell2 shall be configured as PSCell. Prior to start of T1 the DRX inactivity timer for the PSCell have already expired. During T1 the UE shall be continuously scheduled on PCell while not scheduled on PSCell.

**Table A.7.4.5.1-1: General test parameters for E-UTRAN TDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-1 in TS 36.211. Applicable to Cell1 |
| CP length | | Normal | As specified in table 4.2-2 in TS 36.211. Applicable to Cell1 |
| DRX | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | OFF | |
| T1 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is only required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.7.4.5.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Parameter | Unit | Cell1 | Cell2 |
|---|---|---|---|
| | | T1 | T1 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| Special subframe configuration | | 6 | Not applicable |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | Not applicable |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | 19 |
| $\hat{E}_s / I_{ot}$ | dB | 19 | 19 |
| RSRP Note 3 | dBm/15 KHz | -82 | -82 |
| SCH_RP Note 3 | dBm/15 KHz | -82 | -82 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Time offset to cell1 Note 4 | µs | - | 33 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.7.4.5.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer Note 1 | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | Sf160 | |
| shortDRX | disable | disable | |

Note 1: UE is continuously scheduled in PCell

## A.7.4.5.2 Test Requirements

The UE shall be continuously scheduled in PCell during the entire length of T1. UE shall not be scheduled in PSCell during T1. During the time duration T1 the UE shall transmit at leat 99% of ACK/NACK on PCell.

The UE shall not miss transmitting two consequtive ACK/NACK.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.4.6 E-UTRAN FDD-TDD DC interruption at SRS carrier based switching

## A.7.4.6.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will will verify the interruption requirements on PCC in clause 7.12.2.7.

In the test there are three cells: cell1, cell2 and cell3. Cell1 and cell2 are PCell and PSCell on the FDD primary component carriers, Cell3 is activated SCell on the TDD secondary component carrier which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall be continuously scheduled on PCell and PSCell. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

**Table A.7.4.6.1-1: General test parameters for E-UTRAN FDD-TDD DC interruption at SRS carrier based switching**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| PCell | | Cell 1 | Primary cell on RF channel number 1 |
| PSCell | | Cell 2 | Primary cell on RF channel number 2 |
| Configured SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 1 | |
| T2 | ms | 40 | UE shall perform SRS switching during T2 |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.7.4.6.1-2: Cell specific test parameters for E-UTRAN FDD-TDD DC interruption at SRS carrier based switching**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| Special subframe configuration | | - | | 6 | | 6 | |
| Uplink-downlink configuration | | - | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz: 47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Pattern defined in A.3.2.1 and in A.3.2.2 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PCFICH_RB | dB | 0 | | 0 | | 0 | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | -98 | | -98 | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -82 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -82 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 |
| Io Note 3 | dBm/Ch BW | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| timing offset to cell1 | µs | - | | 3 | | - | |
| timing offset to cell1 | µs | - | | - | | 33 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

**Table A.7.4.6.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD-TDD DC interruption at SRS carrier based switching**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | Sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

## A.7.4.6.2 Test Requirements

The UE shall be continuously scheduled in PCell throughout the test and during the time duration T2, at most 6 ACK/NACK loss on PCell shall be detected.

The UE shall be continuously scheduled in PSCell throughout the test and during the time duration T2, at most 6 ACK/NACK loss on PSCell shall be detected.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.4.7 E-UTRAN TDD-TDD DC interruption at SRS carrier based switching

### A.7.4.7.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit aperiodic SRS, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will will verify the interruption requirements on PCC in clause 7.12.2.7.

In the test there are two cells: cell1, cell2 and cell3. Cell1 and cell2 are PCell and PSCell respectively on the TDD primary component carriers, Cell3 is activated SCell on the TDD secondary component carrier which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall be continuously scheduled on PCell and PSCell. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

**Table A.7.4.7.1-1: General test parameters for E-UTRAN TDD-TDD DC interruption at SRS carrier based switching**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Two radio channels are used for this test |
| PCell | | Cell 1 | Primary cell on RF channel number 1 |
| PSCell | | Cell 2 | Primary Secondary cell on RF channel number 2 |
| Configured SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | s | 5 | UE shall perform SRS switching during T2 |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.7.4.7.1-2: Cell specific test parameters for E-UTRAN TDD-TDD DC interruption at SRS carrier based switching**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| Special subframe configuration | | 6 | | 6 | | 6 | |
| Uplink-downlink configuration | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Pattern defined in A.3.2.2 | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | |
| PBCH_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RB | dB | 0 | | 0 | | 0 | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | -98 | | -98 | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -82 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -82 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 |
| Io Note 3 | dBm/Ch BW | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) | -54.11+10log($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| timing offset to cell1 | µs | - | | 3 | | - | |
| timing offset to cell1 | µs | - | | - | | 33 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.7.4.7.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD-TDD DC interruption at SRS carrier based switching**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | Sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

#### A.7.4.7.2 Test Requirements

The UE shall be continuously scheduled in PCell throughout the test and during the time duration T2, at most 4 ACK/NACK loss on PCell shall be detected.

The UE shall be continuously scheduled in PSCell throughout the test and during the time duration T2, at most 4 ACK/NACK loss on PSCell shall be detected.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.5 Proximity-based Services

### A.7.5.1 E-UTRAN FDD – UE ProSe Direct Discovery Transmission Timing Accuracy Test

#### A.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for ProSe Direct Discovery transmissions when PCell downlink timing is used as a reference with $N_{\mathrm{TA,\,SL}} = 0$ . This test will verify the requirements in clause 7.16.2.1.1.1 ProSe Direct Discovery transmissions. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.7.5.1.1-1 below. There is one active cell (PCell) in this test. The transmit timing is verified using the transmission timing of PSDCH.

**Table A.7.5.1.1-1: Test parameters for ProSe Transmission Timing Accuracy test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1 | | R.11 FDD | |
| OCNG Pattern Note2 | | OP.16 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| OCNG_RA Note3 | | | |
| OCNG_RB Note3 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| RSRP Note4 | dBm/15 kHz | -95 | |
| SCH_RP Note 4 | dBm/15 kHz | -95 | |
| Propagation condition | | AWGN | |
| Note 1: For the reference measurement channels, see clause A.3.1. | | | |

| | |
|---|---|
| Note 2: | For the OCNG pattern, see clause A.3.2. |
| Note 3: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 4: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

#### A.7.5.1.2 Test Requirements

For parameters specified in Tables A.7.5.1.1-1, the timing accuracy for ProSe Direct Discvoery transmissions shall be within the limits defined in clause 7.16.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 5MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED DRX with a cycle length of 320ms:

a) After a connection is set up with the cell, the test system shall verify that the ProSe UE transmit timing offset is within $\pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+32\times T_S$ (approximately +1μs) compared to that in (a). The test system shall wait for at least one discovery period (320ms) before verifying the requirement again in (c).

c) The test system shall verify that the UE transmit timing offset stays within $\pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

### A.7.5.2 E-UTRAN TDD – UE ProSe Direct Discovery Transmission Timing Accuracy Test

#### A.7.5.2.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for ProSe Direct Discovery transmissions when PCell downlink timing is used as a reference with $N_{\text{TA, SL}} = 0$ . This test will verify the requirements in clause 7.16.2.1.1.1 for ProSe Direct Discovery transmissions. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.7.5.2.1-1 below. There is one active cell (PCell) in this test. The transmit timing is verified using the transmission timing of PSDCH.

**Table A.7.5.2.1-1: Test parameters for ProSe Transmission Timing Accuracy test for E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| Uplink/Downlink Configuration | | Config 0 | |
| Special Subframe Configuration | | 6 | |
| CP length of Cell 1 | | Normal | |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-3 (Configuration #3) | IE values unless specified otherwise in this test. |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1] | | R.11 TDD | |
| OCNG Pattern[Note2] | | OP.10 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |

| | | | |
|---|---|---|---|
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| OCNG_RA Note3 | | | |
| OCNG_RB Note3 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| RSRP Note4 | dBm/15 kHz | -95 | |
| SCH_RP Note 4 | dBm/15 kHz | -95 | |
| Propagation condition | | AWGN | |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.7.5.1.2 Test Requirements

For parameters specified in Tables A.7.5.2.1-1, the timing accuracy for ProSe Direct Discvoery transmissions shall be within the limits defined in clause 7.16.2.

The following sequence of events shall be used to verify that the requirements are met.

For the 5MHz channel bandwidth, the test sequence shall be carried out in RRC_CONNECTED DRX with a cycle length of 320ms:

a) After a connection is set up with the cell, the test system shall verify that the ProSe UE transmit timing offset is within $624\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+32\times T_S$ (approximately +1μs) compared to that in (a). The test system shall wait for at least one discovery period (320ms) before verifying the requirement again in (c).

c) The test system shall verify that the UE transmit timing offset stays within $624\times T_S \pm 12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

## A.7.5.3 E-UTRAN FDD - Interruptions due to ProSe Direct Discovery

### A.7.5.3.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the allowed PCell interruptions due to ProSe Direct Discovery defined in clause 7.16.3.1 and clause 7.16.3.3. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to monitor ProSe Direct Discovery.

The test parameters are given in Table A.7.5.3.1-1 and Table A.7.5.3.1-2 below. There is one active cell (PCell) in this test and 24 active Sidelink transmissions in this test (with 12 active Sidelink UEs per configured discovery subframe). Two tests (Test 1 and Test 2) are defined to verify interruptions due to synchronous (Test 1) and asynchronous (Test 2) ProSe Direct Discovery.

The tests consist of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the ProSe Direct Discovery announcements from other active Sidelink UEs on the ProSe Direct Discvoery resources.

During T2, the test system establishes a RRC connection with the UE. No PDSCH traffic is scheduled for UE during T2, and the UE is expected to transmit *SidelinkUEInformation* indicating *discRxInterest* during T2. On reception of

*SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformation* for up to [2] sec, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during ProSe Direct Discovery.

**Table A.7.5.3.1-1: Test parameters for interruption due to ProSe Direct Discovery tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| E-UTRA RF Channel Number | | 1 | | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| Active cell | | Cell 1 | | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | | |
| T1 | s | 5.12 | | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [2] sec if UE does not transmit *SidelinkUEInformation* during this period. | | |
| T3 | s | 10.24 | | |

**Table A.7.5.3.1-2: ProSe Direct Discovery configuration for interruption due to ProSe Direct Discovery tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| E-UTRA RF Channel Number | | 1 | | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-1 (Configuration #1) | As specified in Table A.3.12.4-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| Active Sidelink UEs Configuration | | PDP.1.FDD As specified in Table A.3.12.8.2-1 | PDP.2.FDD As specified in Table A.3.12.8.2-1 | Transmitting ProSe Direct Discovery (Test 1 and 2) and SLSS (for Test 2) |

**Table A.7.5.3.1-3: Cell specific test parameters for interruption due to ProSe Direct Discovery tests**

| Parameter | | Unit | Cell 1 | | |
|---|---|---|---|---|---|
| | | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | | 1 | | |
| $BW_{channel}$ | | MHz | 5 | | |
| UE RRC state | | | IDLE | CONNECTED | |
| Paging configuration | defaultPagingCycle | | rf256 | N/A | |
| | nB | | T / 32 | | |
| DRX | | | N/A | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1[Note1] | | | N/A | None | R.5 FDD |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1[Note1] | | | R.11 FDD | | |
| OCNG Pattern | | | OP.16 FDD | | OP.15 FDD |
| PBCH_RA | | dB | 0 | | |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |

| | | |
|---|---|---|
| PHICH_RB | | |
| PDCCH_RA | | |
| PDCCH_RB | | |
| PDSCH_RA | | |
| PDSCH_RB | | |
| OCNG_RA Note 1 | | |
| OCNG_RB Note 1 | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 16 |
| RSRP Note3 | dBm/15 kHz | -82 |
| SCH_RP Note 3 | dBm/15 kHz | -82 |
| Propagation Condition | | AWGN |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.7.5.3.2 Test Requirements

The UE shall be scheduled on PCell continuously during T3.

In Test 1, at least 98.75% of all expected ACK/NACKs during T3 shall be transmitted by the ProSe UE. The missed ACK/NACKs can occur only on subframe 'n', if either n±1 subframe is a discovery subframe, or if n-3, or n-5 is a discovery subframe.

NOTE: For the test configuration in Table A.7.5.3.1-1 and Table A.7.5.3.1-2, the specific subframes where missed ACK/NACKs are allowed are when (subframe mod 320) = 159, 163, 162, 166, corresponding to allowed interruptions on subframe 159 and 162.

In Test 2, at least 97.5% of all expected ACK/NACKs during T3 shall be transmitted by the ProSe UE. The missed ACK/NACK can occur only on subframe 'n', if either n±5 subframe is a discovery or SLSS subframe, or if n+1, or n-9 is a discovery or SLSS subframe.

NOTE: For the test configuration in Table A.7.5.3.1-1 and Table A.7.5.3.1-2, the specific subframes where missed ACK/NACKs are allowed are when (subframe mod 320) = 135, 139, 145, 149, 155, 159, 166, 170, corresponding to allowed interruptions on subframes 135, 145, 155 and 166.

## A.7.5.4 E-UTRAN FDD – UE ProSe Direct Communication Transmission Timing Accuracy Test

### A.7.5.4.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for ProSe Direct Communication transmissions when PCell downlink timing is used as a reference with $N_{\mathrm{TA,SL}} = 0$ . This test will verify the requirements in clause 7.16.2.1.1.1 for ProSe Direct Communication transmissions. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A.7.5.4.1-1 below. There is one active cell (PCell) in this test. The test system will configure the ProSe UE to transmit SLSS in each period (40ms) by configuring *networkControlledSyncTx* as ON via dedicated RRC signaling. The transmit timing is verified using the transmission timing of SLSS transmissions.

**Table A.7.5.4.1-1: Test parameters for ProSe Transmission Timig Accuracy test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |

| | | | |
|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | Note 5 |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| ProSe Direct Communication configuration | | As specified in Table A.3.12.5-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| networkControlledSyncTx | | ON | Configured |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1 | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD | |
| OCNG Pattern Note2 | | 5 MHz: OP.16 FDD<br>10 MHz: OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| OCNG_RA Note3 | | | |
| OCNG_RB Note3 | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| RSRP Note4 | dBm/15 kHz | -95 | |
| SCH_RP Note 4 | dBm/15 kHz | -95 | |
| Propagation condition | | AWGN | |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: This test is according to the principle defined in section A.3.12.3.

### A.7.5.4.2 Test Requirements

For parameters specified in Tables A.7.5.4.1-1, the timing accuracy for ProSe Direct Communication transmissions shall be within the limits defined in clause 7.16.2. The timing accuracy is verified using SLSS transmissions.

The following sequence of events shall be used to verify that the requirements are met.

For 5MHz or 10MHz channel bandwith, the test sequence shall be carried out in RRC_CONNECTED DRX with a cycle length of 320ms:

a) After a connection is set up with the cell, the test system shall verify that the ProSe UE SLSS transmission timing offset is within ± $12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

b) The test system adjusts the downlink transmit timing for the cell by $+32\times T_S$ (approximately +1μs) compared to that in (a). The test system shall wait for at least one SLSS period (40ms) before verifying the requirement again in (c).

c) The test system shall verify that the UE SLSS transmissiontiming offset stays within ± $12\times T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 1.

# A.7.5.5 E-UTRAN FDD - Interruptions due to ProSe Direct Communication

## A.7.5.5.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to PCell interruptions due to ProSe Direct Communication defined in clause 7.16.3. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to monitor ProSe Direct Communication.

The test parameters are given in Table A.7.5.5.1-1, Table A.7.5.5.1-2 and Table A.7.5.5.1-3 below. There is one active cell (PCell) in this test and 12 (5MHz) or 16 (10 MHz) active Sidelink UEs in this test transmitting ProSe Direct Communication.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the ProSe Direct Communication transmission from other active Sidelink UEs on the ProSe Direct Communication resoruces.

During T2, the test system establishes a RRC connection with the UE. No PDSCH traffic is scheduled for UE during T2, and the UE is expected to transmit *SidelinkUEInformation* indicating *commRxInterestedFreq* during T2. On reception of *SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to repond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformation* for up to [2] sec, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during ProSe Direct Communication (no missed ACK/NACKs are allowed).

**Table A.7.5.5.1-1: Test parameters for interruption due to ProSe Direct Communication tests**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| T1 | s | 5.12 | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [2] sec if UE does not transmit *SidelinkUEInformation* during this period. | |
| T3 | s | 10.24 | |
| Note 1: This test is according to the principle defined in section A.3.12.3. | | | |

**Table A.7.5.5.1-2: ProSe Direct Communication specific configuration for interruption due to ProSe Direct Communication tests**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| ProSe Direct Communication configuration | | As specified in Table A.3.12.5-1 (Configuration #1) | IE values unless specified otherwise in this test. |

| | | | |
|---|---|---|---|
| Active Sidelink UEs Configuration[Note 1] | | PCP.1.FDD<br>As specified in Table A.3.12.8.1-1 | Transmitting ProSe Direct Communication (PSCCH + PSSCH) |
| Note 1: This test is according to the principle defined in section A.3.12.3. | | | |

**Table A.7.5.5.1-2: Cell specific test parameters for interruption due to ProSe Direct Communication tests**

| Parameter | | Unit | Cell 1 | | |
|---|---|---|---|---|---|
| | | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | | 1 | | |
| $BW_{channel}$ [Note 4] | | MHz | 5 or 10 | | |
| UE RRC state | | | IDLE | CONNECTED | |
| Paging configuration | defaultPagingCycle | | rf256 | N/A | |
| | nB | | T / 32 | | |
| DRX | | | N/A | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1[Note1, Note 4] | | | N/A | None | R.7 FDD (5MHz) or R.3 FDD (10MHz)<br>(Note 5 applies) |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1[Note1, Note 4] | | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD | | |
| OCNG Pattern [Note 4] | | | 5 MHz: OP.19 FDD<br>10 MHz: OP.6 FDD | | OP.20 FDD (5MHz) or OP.10 FDD (10MHz) |
| PBCH_RA | | dB | 0 | | |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note 1] | | | | | |
| OCNG_RB[Note 1] | | | | | |
| $N_{oc}$ [Note2] | | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | | dB | 16 | | |
| RSRP [Note3] | | dBm/15 kHz | -82 | | |
| SCH_RP [Note 3] | | dBm/15 kHz | -82 | | |
| Propagation Condition | | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: This test is according to the principle defined in section A.3.12.3.

Note 5: The PDSCH scheduled subframes for R.7 FDD (5MHz) / R.3 FDD (10MHz) is changed as per the following bitmap that repeats every 40ms.
PDSCH scheduled subframe bitmap: {01110111 11110111 11110111 11110111 11110110}.

### A.7.5.5.2 Test Requirements

The UE shall be scheduled on PCell continuously during T3. During T3, 100% of all expected ACK/NACKs shall be transmitted by the ProSe UE.

## A.7.5.6 E-UTRAN FDD - Interruptions due to ProSe Direct Discovery with discovery period less than 320ms

### A.7.5.6.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the allowed PCell interruptions due to ProSe Direct Discovery defined in clause 7.16.3.3 when the discovery period less than 320ms. In the test the UE under test is configured only with PCell with the ProSe operation on uplink carrier of the PCell.

This test is applicable to ProSe Direct Discovery capable UEs that support discovery periods of less than 320ms.

For this test, the UE is triggered by the test loop function or the upper layers to monitor ProSe Direct Discovery.

The test parameters are given in Table A.7.5.6.1-1, Table A.7.5.6.1-2, and Table A.7.5.6.1-3 below. There is one active cell (PCell) in this test and 24 active Sidelink transmissions in this test (with 12 active Sidelink UEs per configured discovery subframe).

The tests consist of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the ProSe Direct Discovery announcements from other active Sidelink UEs on the ProSe Direct Discovery resources.

During T2, the test system establishes a RRC connection with the UE. No PDSCH traffic is scheduled for UE during T2, and the UE is expected to transmit *SidelinkUEInformation* indicating *discRxInterest* during T2. On reception of *SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformation* for up to [2] sec, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during ProSe Direct Discovery.

**Table A.7.5.6.1-1: Test parameters for interruption due to ProSe Direct Discovery test with discovery period less than 320ms for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| T1 | s | 0.64 | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [2] sec if UE does not transmit *SidelinkUEInformation* during this period. | |
| T3 | s | 1.28 | |

**Table A.7.5.6.1-2: ProSe Direct Discovery configuration for interruption test due to ProSe Direct Discovery with discovery period less than 320ms for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |

| | | | |
|---|---|---|---|
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-4 (Configuration #4) | IE values unless specified otherwise in this test. |
| Active Sidelink UEs Configuration | | PDP.1.FDD As specified in Table A.3.12.8.2-1 | Transmitting ProSe Direct Discovery |

**Table A.7.5.6.1-3: Cell specific test parameters for interruption due to ProSe Direct Discovery test with discovery period less than 320ms for E-UTRAN FDD**

| Parameter | | Unit | Cell 1 | | |
|---|---|---|---|---|---|
| | | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | | 1 | | |
| $BW_{channel}$ | | MHz | 5 | | |
| UE RRC state | | | IDLE | CONNECTED | |
| Paging configuration | defaultPagingCycle | | rf256 | N/A | |
| | nB | | T / 32 | | |
| DRX | | | N/A | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1 | | | N/A | None | R.5 FDD |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 Note1 | | | R.11 FDD | | |
| OCNG Pattern | | | OP.16 FDD | | OP.15 FDD |
| PBCH_RA | | dB | 0 | | |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note 1 | | | | | |
| OCNG_RB Note 1 | | | | | |
| $N_{oc}$ Note2 | | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | | dB | 16 | | |
| RSRP Note3 | | dBm/15 kHz | -82 | | |
| SCH_RP Note 3 | | dBm/15 kHz | -82 | | |
| Propagation Condition | | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.7.5.6.2 Test Requirements

The UE shall be scheduled on PCell continuously during T3.

The test system shall verify that at least 98.75% of all expected ACK/NACKs during T3 shall be transmitted by the ProSe UE. The missed ACK/NACKs can occur only on subframe ‘n’, if either n±1 subframe is a discovery subframe, or if n-3, or n-5 is a discovery subframe.

NOTE: For the test configuration in Table A.7.5.6.1-1 and Table A.7.5.6.1-2, the specific subframes where missed ACK/NACKs are allowed are when (subframe mod 40) = 19, 23, 22, 26, corresponding to allowed interruptions on subframe (subframe mod 40) = 19 and 22.

# A.7.5.7 E-UTRAN FDD-FDD - Interruptions due to ProSe Direct Discovery

## A.7.5.7.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the allowed PCell interruptions due to ProSe Direct Discovery defined in clause 7.16.3.1 and clause 7.16.3.3. In the test the UE under test is configured with PCell and one SCell, with ProSe operation configured on the PCell.

A UE that meets the requirements of this clause is not required to be tested for the requirements of clause 7.5.3.

For this test, the UE is triggered by the test loop function or the upper layers to monitor ProSe Direct Discovery.

The test parameters are given in Table A.7.5.7.1-1, Table A.7.5.7.1-2, and Table A.7.5.7.1-3 below. There are two configured component carriers: PCC and SCC, and two active cells: Cell 1 and Cell2. Cell1 is the PCell on PCC, and Cell 2 is the SCell on SCC. Sidelink operation is configured on the PCC UL. There are 24 active Sidelink transmissions in this test (with 12 active Sidelink UEs per configured discovery subframe). Two tests (Test 1 and Test 2) are defined to verify interruptions due to synchronous (Test 1) and asynchronous (Test 2) ProSe Direct Discovery.

The tests consist of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the ProSe Direct Discovery announcements from other active Sidelink UEs on the ProSe Direct Discovery resources.

During T2, the test system establishes a RRC connection with the UE. The test system shall configure the UE with the SCC. No PDSCH traffic is scheduled for UE during T2, and the UE is expected to transmit *SidelinkUEInformation* indicating *discRxInterest* during T2. On reception of *SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformation* for up to [2] sec, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on both PCell and SCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during ProSe Direct Discovery.

**Table A.7.5.7.1-1: Test parameters for interruption due to ProSe Direct Discovery tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| E-UTRA RF Channel Number | | 1 | | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| Active cell | | Cell 1, Cell 2 | | E-UTRA FDD Cell1 and Cell 2 on RF channel number 1 and 2, respectively |
| CP length of Cell 1, Cell 2 | | Normal | | |
| T1 | s | 5.12 | | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [2] sec if UE does not transmit *SidelinkUEInformation* during this period. | | |
| T3 | s | 10.24 | | |

**Table A.7.5.7.1-2: ProSe Direct Discovery configuration for interruption due to ProSe Direct Discovery tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| E-UTRA RF Channel Number | | 1 | | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-1 (Configuration #1) | As specified in Table A.3.12.4-2 (Configuration #2) | IE values unless specified otherwise in this test. |

| | | | | |
|---|---|---|---|---|
| Active Sidelink UEs Configuration | | PDP.1.FDD As specified in Table A.3.12.8.2-1 | PDP.2.FDD As specified in Table A.3.12.8.2-1 | Transmitting ProSe Direct Discovery (Test 1 and 2) and SLSS (for Test 2) |

**Table A.7.5.7.1-3: Cell specific test parameters for interruption due to ProSe Direct Discovery tests**

| Parameter | | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | | 1 | | | 2 | | |
| $BW_{channel}$ | | MHz | 5 | | | 5 | | |
| UE RRC state | | | IDLE | CONNECTED | | N/A | | |
| Paging configuration | defaultPaging Cycle | | rf256 | N/A | | N/A | | |
| | nB | | T / 32 | | | | | |
| DRX | | | N/A | OFF | | N/A | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1 | | | N/A | None | R.5 FDD | N/A | None | R.5 FDD |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 Note1 | | | R.11 FDD | | | R.11 FDD | | |
| OCNG Pattern | | | OP.16 FDD | | OP.15 FDD | OP.16 FDD | | OP.15 FDD |
| PBCH_RA | | dB | 0 | | | 0 | | |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note 1 | | | | | | | | |
| OCNG_RB Note 1 | | | | | | | | |
| $N_{oc}$ Note2 | | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | | dB | 16 | | | 16 | | |
| RSRP Note3 | | dBm/15 kHz | -82 | | | -82 | | |
| SCH_RP Note 3 | | dBm/15 kHz | -82 | | | -82 | | |
| Propagation Condition | | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.7.5.7.2 Test Requirements

The UE shall be scheduled on PCell and SCell downlink continuously during T3.

In Test 1, at least 98.75% of all expected ACK/NACKs during T3 shall be transmitted by the ProSe UE. The missed ACK/NACKs can occur only on subframe ‘n’, if either n±1 subframe is a discovery subframe, or if n-3, or n-5 is a discovery subframe.

NOTE: For the test configuration in Table A.7.5.12.1-1 and Table A.7.5.12.1-2, the specific subframes where missed ACK/NACKs are allowed are when (subframe mod 320) = 159, 163, 162, 166, corresponding to allowed interruptions on subframe 159 and 162.

In Test 2, at least 97.5% of all expected ACK/NACKs during T3 shall be transmitted by the ProSe UE. The missed ACK/NACK can occur only on subframe 'n', if either n±5 subframe is a discovery or SLSS subframe, or if n+1, or n-9 is a discovery or SLSS subframe.

NOTE: For the test configuration in Table A.7.5.7.1-1 and Table A.7.5.7.1-2, the specific subframes where missed ACK/NACKs are allowed are when (subframe mod 320) = 135, 139, 145, 149, 155, 159, 166, 170, corresponding to allowed interruptions on subframes 135, 145, 155 and 166.

## A.7.5.8 E-UTRAN FDD-FDD - Cell reselection and timing accuracy for ProSe Direct Discovery transmission on non-serving frequency

### A.7.5.8.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to cell reselection and timing accuracy for ProSe Direct Discovery transmissions on a non-serving frequency defined in clauses 7.16.4 and 7.16.2.1.2, respectively. In the test the UE under test is configured with PCell on a serving frequency, and the PCell provides the ProSe Direct Discovery resources for a non-serving frequency.

This test is applicable for ProSe Direct Discovery capable UEs that support concurrent inter-band E-UTRAN and E-UTRAN ProSe operation, and indicates the support of inter-frequency discovery transmission using *discInterFreqTx*.

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.7.5.8.1-1, Table A.7.5.8.1-2, and Table A.7.5.8.1-3 below. The test consists of one active serving cell (cell 1) on the serving RF channel 1, and two active non-serving cells (cell 2 and cell3) on the non-serving discovery RF channel 2.

The tests consist of three successive time periods, with time duration of T1, T2 and T3 respectively.

The serving cell (cell 1 on RF channel 1) is active during the entire test duration (T1, T2, T3) without any changes to cell 1 RSRP. Prior to start of the test, the test system shall verify that the UE is transmitting ProSe Direct Discovery transmissions on the non-serving RF channel 2.

During T1, only one non-serving cell (cell 2 on RF channel 2) is active. The UE is expected to be following the timing of cell 2 for its discovery transmissions on RF channel 2. During T2, cell 3 on the non-serving RF channel 2 is also turned ON and is configured to be better ranked than cell 2. The UE is expected to reselect to cell 3 for discovery transmit timing. During T3, RSRP of cell 2 is increased so that it becomes better ranked than cell 3. The UE is supposed to reselect back to cell 2 and follow its timing for discovery transmissions.

**Table A.7.5.8.1-1: Test parameters for cell reselection and timing accuracy for ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | RF channel 1 is serving<br>RF channel 2 is non-serving |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | Serving E-UTRA FDD cell on RF channel number 1 |
| Non-serving cell | | Cell 2, Cell 3 | Non-serving E-UTRA FDD cells on RF channel number 2 |
| CP length of Cell 1, 2, 3 | | Normal | |
| T1 | s | 2 | |
| T2 | s | 14 | |
| T3 | s | 5 | |

**Table A.7.5.8.1-2: ProSe Direct Discovery configuration for cell reselection and timing accuracy for ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 2 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-5 (Configuration #5) | IE values unless specified otherwise in this test.<br><br>Broadcasted in SIB19 by Cell 1 on RF channel 1 |
| *discInterFreqList/ carrierFreq* | | RF channel 2 (UL frequency) | |
| *freqInfo/ul-CarrierFreq* | | RF channel 2 (UL frequency) | |
| *rxParamsAddNeighFreq/physCellId* | | {phyCellId of Cell 2, phyCellId of Cell 3} | |
| *txParamsAddNeighFreq/physCellId* | | {phyCellId of Cell 2, phyCellId of Cell 3} | |

**Table A.7.5.8.1-3: Cell specific test parameters for cell reselection and timing accuracy for ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| Serving / Non-serving | | Serving | | | Non-serving | | | Non-serving | | |
| $BW_{channel}$ | MHz | 5 | | | 5 | | | 5 | | |
| drx-Configuration | | DRX_P1 As specified in Table A.3.12.2-1 | | | N/A | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.2 | | OP.16 FDD | | | OP.19 FDD | | | OP.19 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| Timing offset | us | 0 | | | 0 | | | 2 | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | | | | | | |
| RSRP Note 3 | dBm/15 kHz | -82 | | | -82 | -85 | -82 | -infinity | -82 | -85 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | | | 16 | -3.11 | 2.79 | -infinity | 2.79 | -3.11 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | | | 16 | 13 | 16 | -infinity | 13 | 16 |
| SCH_RP Note 3 | dBm/15kHz | -82 | | | -82 | -85 | -82 | -infinity | -82 | -85 |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.7.5.8.2 Test Requirements

During T1, the test system shall verify that the transmit timing offset of discovery transmission on RF channel 2 is within ± 12×$T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 2.

During T2, the UE is expected to reselect to cell 3 for discovery timing synchronization after cell reselection delay to a newly detectable cell from start of T2. After the period of cell reselection delay to a newly detectable cell from the start of T2, the test system shall verify that the transmit timing offset of discovery transmission on RF channel 2 are within ± 12×$T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 3.

The cell reselection delay to a newly detectable cell for discovery transmission on non-serving carrier shall be 10.56s.

NOTE: The cell reselection delay to a newly detectable cell for discovery transmission on non-serving carrier can be expressed as ($T_{detect,EUTRAN_ProSe_Intra}$ + 1 discovery period).

During T3, the UE is expected to reselect back to cell 2 for discovery timing synchronization after cell reselection delay to an already detected cell from start of T3. After the period of cell reselection delay to a newly detectable cell from the start of T3, the test system shall verify that the transmit timing offset of discovery transmission on RF channel 2 are within ± 12×$T_S$ with respect to the first detected path (in time) of the corresponding downlink frame of cell 2.

The cell reselection delay to an already detected cell for discovery transmission on non-serving carrier shall be 5.44s.

NOTE: The cell reselection delay to an already detected cell for discovery transmission on non-serving carrier can be expressed as ($T_{evaluate,\ E\text{-}UTRAN_ProSe_Intra}$ + 1 discovery period).

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.5.9 E-UTRAN FDD-FDD - Interruptions due to ProSe Direct Discovery reception on non-serving frequency

### A.7.5.9.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to ProSe Direct Discovery reception on a non-serving frequency as defined in clause 7.16.3.3 and 7.16.3.4. In the test the UE under test is configured with PCell on a serving frequency, and the PCell provides the ProSe Direct Discovery resources for a non-serving frequency.

This test is applicable for ProSe Direct Discovery capable UEs that support concurrent inter-band E-UTRAN and E-UTRAN ProSe operation.

For this test, the UE is triggered by the test loop function or the upper layers to monitor ProSe Direct Discovery.

The test parameters are given in Table A.7.5.9.1-1, Table A.7.5.9.1-2, and Table A.7.5.9.1-3 below. The test consists of one active serving cell (cell 1) on the serving RF channel 1, and one active non-serving cells (cell 2) on the non-serving discovery RF channel 2. There are 96 active Sidelink transmissions in this test (with 12 active Sidelink UEs per configured discovery subframe) on RF channel 2.

After the test system establishes a RRC connection with the UE, the UE is expected to transmit *SidelinkUEInformation* indicating *discRxInterest*. On reception of *SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before start of the test. Further, depending on UE implementation, the UE may request for discovery reception gaps (using *discRxGapReq*) for the ProSe Direct Discovery reception operation on the non-serving frequency. If gaps are requested, the test system shall configure the gaps as requested and modify the PDSCH scheduling on cell 1 for this UE such that the UE is not scheduled on the DL on the subframes configured as reception gaps.

The test shall start after the completion of the RRC reconfiguration is complete following the *SidelinkUEInformation* message transmission from the UE. The test system shall then continuously schedule the UE on DL of cell 1 (apart from any subframes that are configured as discovery gaps).

**Table A.7.5.9.1-1: Test parameters for interruptions due to ProSe Direct Discovery reception on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | RF channel 1 is serving<br>RF channel 2 is non-serving |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | Serving E-UTRA FDD cell on RF channel number 1 |
| Non-serving cell | | Cell 2 | Non-serving E-UTRA FDD cell on RF channel number 2 |
| CP length of Cell 1, 2 | | Normal | |

**Table A.7.5.9.1-2: ProSe Direct Discovery configuration for interruptions due to ProSe Direct Discovery reception on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 2 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-5 (Configuration #5) | IE values unless specified otherwise in this test.<br><br>Broadcasted in SIB19 by Cell 1 on RF channel 1 |
| *discInterFreqList/carrierFreq* | | RF channel 2 (UL frequency) | |
| *freqInfo/ul-CarrierFreq* | | RF channel 2 (UL frequency) | |
| *rxParamsAddNeighFreq/physCellId* | | {phyCellId of Cell 2} | |
| *txParamsAddNeighFreq/physCellId* | | {phyCellId of Cell 2} | |
| *discResourcesNonPS/*<br>*discRxResourcesInterFreq/*<br>*tf-ResourceConfig/*<br>*subframeBitmap* | | 11111111<br>00000000<br>00000000<br>00000000<br>00000000 | |
| Active Sidelink UEs Configuration | | PDP.1.FDD<br>As specified in Table A.3.12.8.2-1 | Transmitting ProSe Direct Discovery on RF channel 2 |

**Table A.7.5.9.1-3: Cell specific test parameters for interruptions due to ProSe Direct Discovery reception on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 |
| Serving/Non-serving | | Serving | Non-serving |
| $BW_{channel}$ | MHz | 5 | 5 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| drx-Configuration | | None | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1] | | R.11 FDD | R.11 FDD |

| | | | |
|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1 | | R.7 FDD (NOTE 5 applies) | N/A |
| OCNG Pattern defined in A.3.2.1 | | OP.20 FDD | OP.19 FDD |
| PCFICH_RB | dB | 0 | 0 |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 |
| RSRP Note4 | dBm/15 kHz | -82 | -82 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 |
| Propagation condition | | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Scheduling pattern for PDSCH modified to omit the subframes configured as Discovery Gaps in the test.

### A.7.5.9.2 Test Requirements

The test system shall verity the allowed interruptions for ProSe Direct Discovery reception on non-serving frequency, and depends on the discovery gap configuration for the UE.

If no discovery gaps are configured, the test system shall verify that the total number of missed ACK/NACKs on the serving cell are less than 0.5%.

If discovery gaps are configured as requested by the UE, then test system shall verify that the missed ACK/NACKs, if any, correspond to locations as specified in subclause 7.16.3.4:

- Missed ACK/NACKs is allowed on a subframe *n*, if subframe *n* is configured as downlink reception gap (using *discRxGapConfig*) and either the subframe immediately preceding or immediately following that subframe is not configured as reception gap, and

- One additional missed ACK/NACK per discovery period is allowed on a subframe *m*, such that the subframe *m* is configured as reception gap.

## A.7.5.10 E-UTRAN FDD-FDD - Interruptions due to ProSe Direct Discovery transmission on non-serving frequency

### A.7.5.10.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to ProSe Direct Discovery reception on a non-serving frequency as defined in clause 7.16.3.3 and 7.16.3.4. In the test the UE under test is configured with PCell on a serving frequency, and the PCell provides the ProSe Direct Discovery resources for a non-serving frequency.

This test is applicable for ProSe Direct Discovery capable UEs that support concurrent inter-band E-UTRAN and E-UTRAN ProSe operation, and indicates the support of inter-frequency discovery transmission using *discInterFreqTx*.

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.7.5.10.1-1, Table A.7.5.10.1-2, and Table A.7.5.10.1-3 below. The test consists of one active serving cell (cell 1) on the serving RF channel 1, and one active non-serving cells (cell 2) on the non-serving discovery RF channel 2.

After the test system establishes a RRC connection with the UE, the UE is expected to transmit *SidelinkUEInformation*. On reception of *SidelinkUEInformation*, the test system shall RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before start of the test. Further, depending on UE implementation, the UE may request for discovery transmission and/or reception gaps (using *discTxGapReq* and/or *discRxGapReq*) for the ProSe Direct Discovery transmission operation on the non-serving frequency. If transmission gap is requested, the test system shall configure the transmission gap as requested. The test system shall not configure any reception gap for the UE for the purpose of this test.

The test shall start after the completion of the RRC reconfiguration is complete following the *SidelinkUEInformation* message transmission from the UE. The test system shall then continuously schedule the UE on DL of cell 1.

**Table A.7.5.10.1-1: Test parameters for interruptions due to ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | RF channel 1 is serving<br>RF channel 2 is non-serving |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | Serving E-UTRA FDD cell on RF channel number 1 |
| Non-serving cell | | Cell 2 | Non-serving E-UTRA FDD cell on RF channel number 2 |
| CP length of Cell 1, 2 | | Normal | |

**Table A.7.5.10.1-2: ProSe Direct Discovery configuration for interruptions due to ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 2 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-5 (Configuration #5) | IE values unless specified otherwise in this test.<br><br>Broadcasted in SIB19 by Cell 1 on RF channel 1 |
| *discInterFreqList/carrierFreq* | | RF channel 2 (UL frequency) | |
| *freqInfo/ul-CarrierFreq* | | RF channel 2 (UL frequency) | |
| *txParamsAddNeighFreq/physCellId* | | {phyCellId of Cell 2} | |
| *discConfigOther/*<br>*refCarrierCommon* | | pCell | Configure UE to use pCell as reference for synchronization and measurements for discovery transmission on non-serving carrier |
| *discResourcesNonPS/*<br>*discRxResourcesInterFreq* | | Not configured | |
| *discResourcesNonPS/*<br>*discTxResourcesInterFreq/*<br>*tf-ResourceConfig/* | | 11111111<br>00000000<br>00000000 | |

| | | | |
|---|---|---|---|
| *subframeBitmap* | | 00000000<br>00000000 | |
| *discRxGapConfig* | | Not configured | Within *SL-DiscConfig* in RRC reconfiguration message |
| *discTxGapConfig* | | Configured as requested by UE in *discTxGapReq* | Within *SL-DiscConfig* in RRC connection reconfiguration message |

**Table A.7.5.10.1-3: Cell specific test parameters for interruptions due to ProSe Direct Discovery transmission on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 |
| Serving/Non-serving | | Serving | Non-serving |
| $BW_{channel}$ | MHz | 5 | 5 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| drx-Configuration | | None | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1 | | R.11 FDD | R.11 FDD |
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1 | | R.7 FDD | N/A |
| OCNG Pattern defined in A.3.2.1 | | OP.20 FDD | OP.19 FDD |
| PCFICH_RB | dB | 0 | 0 |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 |
| $N_{oc}$ | dBm/15 kHz | -98 | -98 |
| RSRP Note4 | dBm/15 kHz | -82 | -82 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 |
| Propagation condition | | AWGN | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.7.5.10.2 Test Requirements

The test system shall verity the allowed interruptions for ProSe Direct Discovery trannsmission on non-serving frequency.

If no discovery transmission gaps are configured, the test system shall verify that the total number of missed ACK/NACKs on the serving cell are less than 0.5%.

If discovery transmission gaps are configured as requested by the UE, the test system shall verify that the number of missed ACK/NACKs are less than or equal to 5 missed ACK/NACKs during a discovery period (configured as 320ms in this test). Corresponding to discovery transmission on s subframe *n* (with respect to PCell) on the non-serving carrier, the missed ACK/NACKs are allowed only on subframes (*n*-1), *n*, (*n*+1), (*n*+3), (*n*+5).

## A.7.5.11 E-UTRAN FDD-FDD - Interruptions due to ProSe Direct Communication on non-serving frequency

### A.7.5.11.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to ProSe Direct Communication on a non-serving frequency as defined in clause 7.16.3.5. In the test the UE under test is configured with PCell on a serving frequency, and is pre-configured with ProSe Direct Communication resources for a non-serving frequency.

This test is applicable for ProSe Direct Communication capable UEs that support concurrent inter-band E-UTRAN and E-UTRAN ProSe operation.

For this test, the UE is triggered by the test loop function or the upper layers to receive ProSe Direct Communication.

The test parameters are given in Table A.7.5.11.1-1, Table A.7.5.11.1-2, Table A.7.5.11.1-3 and Table A.7.5.11.1-4 below. The test consists of one active serving cell (cell 1) on the serving RF channel 1, and there are no active cells on RF channel 2. On RF channel 2, the test consists of one active SyncRef UE (SyncRef UE 1) transmitting synchronization signals and channels, and 12 (5MHz) or 16 (10 MHz) active Sidelink UEs in this test transmitting ProSe Direct Communication.

The serving cell (cell 1) on RF channel 1 is not broadcasting SIB18, and the UE is expected to use its preconfigured parameters for ProSe Direct Communication operation on RF channel 2.

The UE is continuously scheduled with PDSCH traffic on PCell downlink in RF channel 1.

**Table A.7.5.11.1-1: Test parameters for interruptions due to ProSe Direct Communication on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | RF channel 1 is serving<br>RF channel 2 is non-serving |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | Cell 1 | Serving E-UTRA FDD cell on RF channel number 1<br>(Not broadcasting SIB18) |
| Active SyncRef UEs | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on uplink of RF channel number 2 |
| CP length of Cell 1 | | Normal | |

**Table A.7.5.11.1-2: ProSe Direct Communication configuration for interruptions due to ProSe Direct Communication on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 2 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-2 (Configuration #2) | IE values unless specified otherwise in this test. (Preconfigured) |

| | | | |
|---|---|---|---|
| Active Sidelink UEs Configuration[Note 1] | | PCP.1.FDD<br>As specified in Table A.3.12.8.1-1 | Transmitting ProSe Direct Communication (PSCCH + PSSCH)<br><br>Using SyncRef UE1 as synchronization source |
| Note 1: This test is according to the principle defined in section A.3.12.3. | | | |

**Table A.7.5.11.1-3: SyncRef UE specific test parameters for interruptions due to ProSe Direct Communication on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | SyncRef UE 1 |
|---|---|---|
| E-UTRA RF Channel Number | | 2 |
| $BW_{channel}$[Note 4] | MHz | 5 or 10 |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-1 (Configuration #1)<br>Note resource pool is same as Configuration #2 used by ProSe UE. |
| syncOffsetIndicator | | Set same as *syncOffsetIndicator1* in ProSe Direct Communication preconfiguration |
| slssid | | 30 |
| inCoverage | | TRUE |
| networkControlledSyncTx | | ON |
| $N_{oc}$ [Note1] | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 16 |
| S-RSRP [Note2, Note3] | dBm/15 kHz | -82 |
| Propagation Condition | | AWGN |
| Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.<br>Note 2: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.<br>Note 4: This test is according to the principle defined in section A.3.12.3. | | |

**Table A.7.5.11.1-4: Cell specific test parameters for interruptions due to ProSe Direct Communication on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Cell1 |
|---|---|---|
| E-UTRA RF Channel Number | | 1 |
| E-UTRA RF Channel Number | | 1 |
| Serving/Non-serving | | Serving |
| $BW_{channel}$ [Note 5] | MHz | 5 or 10 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low |
| drx-Configuration | | None |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1, Note 5] | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD |
| PDSCH Reference measurement channel defined in A.3.1.1.1[Note1, Note 5] | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD |
| OCNG Pattern defined in A.3.2.1 | | 5 MHz: OP.20 FDD<br>10 MHz: OP.10 FDD |
| PCFICH_RB | dB | 0 |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PBCH_RA | dB | |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |

| | | |
|---|---|---|
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $\hat{E}_s / N_{oc}$ | dB | 16 |
| $N_{oc}$ | dBm/15 kHz | -98 |
| RSRP Note4 | dBm/15 kHz | -82 |
| SCH_RP Note 4 | dBm/15 kHz | -82 |
| Propagation condition | | AWGN |
| Note 1: For the reference measurement channels, see clause A.3.1.<br>Note 2: For the OCNG pattern, see clause A.3.2.<br>Note 3: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 5: This test is according to the principle defined in section A.3.12.3. | | |

### A.7.5.11.2 Test Requirements

The test system shall verify that the total number of missed ACK/NACKs on the serving cell on RF channel 1 are less than 0.5%.

## A.7.5.12 E-UTRAN FDD - Selection / Reselection of ProSe relay UE

### A.7.5.12.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to selection / reselection of ProSe relay UE defined in clauses 7.16.5. In the test the UE under test is configured with PCell and is configured with ProSe Direct Discovery and ProSe Direct Communication resources as required for remote UE operation.

This test is applicable to UEs capable of ProSe Direct Discovery and ProSe Direct Communication, and further support the optional feature of sidelink remote UE operation.

The test parameters are given in Table A.7.5.12.1-1, Table A.7.5.12.1-2, Table A.7.5.12.1-3, Table A.7.5.12.1-4, and Table A.7.5.12.1-5 below. The test consists of one active serving cell (cell 1), and two active Sidelink relay UEs (Sidelink Relay UE 1, Sidelink Relay UE 2). The Sidelink relay UEs are configured to be transmitting relay discovery messages every discovery period.

The test system shall ensure that the remote UE under test has transmitted *SidelinkUEInformation* message and has been configured with the ProSe Direct Discovery resources for relay operation prior to the start of the test.

The tests consist of five successive time periods, with time duration of T1, T2, T3, and T4 respectively.

During T1, RSRP of cell 1 is kept higher than *threshHigh* (within *remoteUE-Config*), and the remote UE is not required to perform relay UE selection.

During T2, RSRP of cell 1 is configured to be lower than *threshHigh.* The UE is expected to start looking for relay UE and request the serving cell for ProSe Direct Communication resources for communicating with a candidate Sidelink Relay UE. The test system shall ensure that the UE under test transmits the *SidelinkUEInformation* message (requesting the ProSe Direct Communication resources) and has been configured the resource pool prior to end of T2 duration. During T2, the SD-RSRP of Sidelink Relay UE 1 and Sidelink Relay UE 2 is configured to be lower than the detection threshold and no relay UE will be available for the remote UE under test.

During T3, the SD-RSRP of Sidelink Relay UE 1 is raised above the detection threshold and the UE is expected to perform relay selection to Sidelink Relay 1. The test system can determine that the remote UE has selected a relay by monitoring the configured ProSe Direct Communication resource for the direct communication setup message to the relay UE.

During T4, the UE is expected to complete the direct communication setup with the relay UE. Note that the RSRP of the serving cell (cell 1) and the SD-RSRP of sidelink relay UEs is kept unchanged during T3. The period T3 ends when Sidelink Relay UE1 sends the direct communication accept message back to the remote UE.

During T5, SD-RSRP of Sidelink Relay UEs are modified such that the remote UE is expected to reselect to Sidelink Relay UE2.

**Table A.7.5.12.1-1: Test parameters for selection / reselection of ProSe relay UE test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | Serving E-UTRA FDD cell on RF channel number 1 (Broadcasting SIB18 and SIB19) |
| Active Relay UEs | | Relay UE 1, Relay UE 2 | Transmitting relay discovery message |
| CP length of Cell 1 | | Normal | |
| T1 | ms | 100 | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to [1] sec if UE does not transmit *SidelinkUEInformation* during this period. | |
| T3 | s | 1 | |
| T4 | s | [2] | |
| T5 | s | 1 | |

**Table A.7.5.12.1-2: ProSe Direct Discovery configuration for selection / reselection of ProSe relay UE test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-4 (Configuration #4) | IE values unless specified otherwise in this test. |
| *discRxPoolPS/numRetx* | | 3 | |
| *discRxPoolPS/ tf-ResourceConfig/ offsetIndicator* | | 0 | To align with communications resource pool offset |
| *discRxPoolPS/ tf-ResourceConfig/ subframeBitmap* | | 00111100 00000000 00000000 00000000 00000000 | To avoid collision with communication resource pool, and allow for 4 retransmissions |
| *remoteUE-Config/threshHigh* | | -91dBm | |
| Note 1: This test is according to the principle defined in section A.3.12.3. | | | |

**Table A.7.5.12.1-3: ProSe Direct Communication configuration for selection / reselection of ProSe relay UE test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| *commRxPool/ sc-TFResourceConfig/ subframeBitmap* | | 00000011 00000000 00000000 00000000 00000000 | To avoid collision with discovery resource pool |
| *commTxPoolNormalCommon/ sc-TFResourceConfig/ subframeBitmap* | | 00000011 00000000 00000000 00000000 00000000 | |

| | | | |
|---|---|---|---|
| *commTxAllowRelayCommon* | | true | Configured in SIB18 |
| Note 1: This test is according to the principle defined in section A.3.12.3. | | | |

**Table A.7.5.12.1-4: Sidelink Relay UE specific test parameters for selection / reselection of ProSe relay UE test for E-UTRAN FDD**

| Parameter | Unit | Relay UE 1 | | | | | Relay UE 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 (UL frequency) | | | | | | | | | |
| $BW_{channel}$ Note 4 | MHz | 5 | | | | | | | | | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.7.5.12.1-2 | | | | | | | | | |
| Transmission frequency | | Every discovery period (40ms) with 3 retransmissions per period | | | | | | | | | |
| Resource allocation | | Non-overlapping PRBs | | | | | | | | | |
| $N_{oc}$ Note1 | dBm/15 kHz | -97 | | | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -inf | -inf | 10.5 | 10.5 | -1.5 | -inf | -inf | -inf | -inf | 10.5 |
| SD-RSRP Note2, Note 3 | dBm/15 kHz | -inf | -inf | -86.5 | -86.5 | -98.5 | -inf | -inf | -inf | -inf | -86.5 |
| Propagation Condition | | AWGN | | | | | | | | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: SD-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

Note 4: This test is according to the principle defined in section A.3.12.3.

**Table A.7.5.12.1-5: Cell specific test parameters for interruptions due to ProSe Direct Communication on non-serving frequency test for E-UTRAN FDD-FDD**

| Parameter | Unit | Cell1 | | | | |
|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | |
| Serving/Non-serving | | Serving | | | | |
| $BW_{channel}$ Note 5 | MHz | 5 | | | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | | |
| drx-Configuration | | DRX_P1<br>As specified in Table A.3.12.2-1 | | | | |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1, Note 5 | | R.11 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 | | OP.16 FDD | | | | |
| PCFICH_RB | dB | 0 | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PBCH_RA | dB | | | | | |
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note1 | dB | | | | | |
| OCNG_RB Note1 | dB | | | | | |
| $N_{oc}$ | dBm/15 kHz | -97 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 10.5 | 1.5 | 1.5 | 1.5 | 1.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| RSRP Note4 | dBm/15 kHz | -86.5 | -95.5 | -95.5 | -95.5 | -95.5 |
| Propagation condition | | AWGN | | | | |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: This test is according to the principle defined in section A.3.12.3.

### A.7.5.12.2 Test Requirements

Sidelink relay UE selection delay is defined as the time from the beginning of time period T3 to the moment when the UE selects the Sidelink Relay UE1 and transmits the PC5-SP direct communication setup message using ProSe Direct Communications.

The test system shall verify that the sidelink relay UE selection delay is less than 680ms.

NOTE: The sidelink relay UE selection delay can be expressed as ($T_{evaluate,\ ProSe_Relay_intra}$ + 1 *sc-period*).

Sidelink relay UE reselection time is defined as the time from the beginning of time period T5 to the moment when the UE reselects to Sidelink relay UE2 and transmits the direct communication setup message using ProSe Direct Communications.

The test system shall verify that the sidelink relay UE reselection delay is less than 800ms.

NOTE: The sidelink relay UE reselection delay can be expressed as ($T_{measure,ProSe_Relay_Intra}$ + $T_{evaluate,\ ProSe_Relay_intra}$ + 1 *sc-period*).

## A.7.6 Interruption for carrier aggregation

## A.7.6.1 E-UTRAN FDD-TDD CA interruption at SRS carrier based switching

### A.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit periodic SRS, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will will verify the interruption requirements on PCC in clause 7.8.2.13

In the test there are two cells: cell1 and cell2. Cell1 is PCell on the FDD primary component carrier, Cell2 is activated SCell on the TDD secondary component carrier which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall be continuously scheduled on PCell. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

**Table A.7.6.1.1-1: General test parameters for E-UTRAN FDD-TDD CA interruption at SRS carrier based switching**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | ms | 40 | UE shall perform SRS switching during T2 |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.7.6.1.1-2: Cell specific test parameters for E-UTRAN FDD-TDD CA interruption at SRS carrier based switching**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| Special subframe configuration | | - | | 6 | |
| Uplink-downlink configuration | | - | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz: 47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Pattern defined in A.3.2.1 and in A.3.2.2 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | -98 | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | 16 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 |
| Io Note 3 | dBm/Ch BW | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| timing offset to cell1 | µs | - | | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

| |
|---|
| Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation |

**Table A.7.6.1.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD-TDD CA interruption at SRS carrier based switching**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.6.1.2 Test Requirements

The UE shall be continuously scheduled in PCell throughout the test and during the time duration T2, at most 6 ACK/NACK loss on PCell shall be detected.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.6.2 E-UTRAN TDD-TDD CA interruption at SRS carrier based switching

### A.7.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that when a UE needs to transmit periodic SRS, the UE can perform carrier based switching to one PUSCH-less SCCs from a CC with PUSCH. The test will will verify the interruption requirements on PCC in clause 7.8.2.13

In the test there are two cells: cell1 and cell2. Cell1 is PCell on the TDD primary component carrier, Cell2 is activated SCell on the TDD secondary component carrier which operats in downlink without PUCCH/PUSCH. The UE is configured with the SRS switching between PCell and SCell. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall be continuously scheduled on PCell. Immediately at the beginning of T2, a PDCCH with SRS-TPC-RNTI is sent to the UE to initiate SRS switching.

**Table A.7.6.2.1-1: General test parameters for E-UTRAN TDD-TDD CA interruption at SRS carrier based switching**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | ms | 40 | UE shall perform SRS switching during T2 |

NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.7.6.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD CA interruption at SRS carrier based switching**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| Special subframe configuration | | 6 | | 6 | |
| Uplink-downlink configuration | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Pattern defined in A.3.2.2 | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | -98 | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | 16 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 |
| Io Note 3 | dBm/Ch BW | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) | -54.11+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| timing offset to cell1 | μs | - | | 0 | |
| Time alignment error relative to cell 1 Note 5 | μs | - | | ≤ TAE | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

**Table A.7.6.2.1-3: Sounding Reference Symbol Configuration for E-UTRAN TDD-TDD CA interruption at SRS carrier based switching**

| Field | Value | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | Sc8 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 47 | SRS periodicity of 40ms. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.7.6.2.2 Test Requirements

The UE shall be continuously scheduled in PCell throughout the test and during the time duration T2, at most 4 ACK/NACK loss on PCell shall be detected.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8 UE Measurements Procedures

The reference channels in this clause assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

## A.8.1 E-UTRAN FDD Intra-frequency Measurements

### A.8.1.1 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells

#### A.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.1.2.2.1.1.

The test parameters are given in Table A.8.1.1.1-1 and A.8.1.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.1.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.2 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells

### A.8.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.1.2.2.1.1

The test parameters are given in Table A.8.1.2.1-1 and A.8.1.2.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. PDCCHs indicating new transmissions or retransmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.2.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.2.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|

| | | T1 | T2 | T1 | T2 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.3 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX

### A.8.1.3.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.1.3.1-1, A.8.1.3.1-2, A.8.1.3.1-3 and A.8.1.3.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of

two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.3.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| A3-Offset | dB | -6 | | |
| CP length | | Normal | | |
| Hysteresis | dB | 0 | | |
| Time To Trigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| DRX | | ON | | DRX related parameters are defined in Table A.8.1.3.1-3 |
| Time offset between cells | | 3 μs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.1.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.3.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.3.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.3.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.1.4 Void

## A.8.1.5 E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.1.5.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.2.3.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.5.1-1 and A.8.1.5.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.1.5.1-1: General test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.1.5.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | OP.10 FDD | OP.10 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | **0** | | | **0** | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.5.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.2.3.1. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.1.6 E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX

### A.8.1.6.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.2.3. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.6.1-1, A.8.1.6.1-2, A.8.1.6.1-3 and A.8.1.6.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.1.6.1-1: General test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.6.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE shall report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.1.6.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | **0** | | | **0** | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.6.1-3: DRX configuration for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.6.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.6.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.1.7 E-UTRAN FDD-FDD Intra-Frequency Event-Triggered Reporting under Time Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.8.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects and reports Event A3 (Neighbour becomes offset better than PCell) defined in TS 36.331 [2] within the requirements specified in Clause 8.1.2.8.1.1 under a time domain measurement resource restriction and non-MBSFN ABS configured in the aggressor cell.

The test parameters are given in Tables A.8.1.7.1-1 and A.8.1.7.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A3 is used. In the test there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. Cell 1 is the PCell, and it is also the aggressor cell to Cell 2. Cell 2 is the cell to be identified. The test consists of two successive time periods with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information on Cell 2.

Non-MBSFN ABS pattern is configured for Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency

measurements on neighbour cells. The UE is also configured with a time domain measurement resource restriction pattern for the PCell measurements. The information for both measurement patterns shall be provided to the UE via higher layers during T1.

**Table A.8.1.7.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| PCell | | Cell 1 | Also the aggressor cell. Active in T1 and T2 |
| Neighbour cell | | Cell 2 | Cell to be identified. Active only in T2. |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For all cells in the test |
| A3-Offset | dB | -11 | |
| Event A3 measurement quantity | | RSRP | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Physical cell ID PCI | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 !=0 | Cell PCIs are selected so that the condition is met |
| ABS pattern | | '10000000100000001000000010000000010000000' | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1 during T1.<br>The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '10000000100000001000000010000000010000000' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331, clause 6.3.5.<br>Configured during T1 for Cell 2 measurements. |
| Time domain measurement resource restriction pattern for PCell measurements | | '01000000010000000100000001000000001000000' | Configured during T1 for Cell 1 measurements |

**Table A.8.1.7.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.5 FDD | | OP.6 FDD | |
| PBCH_RA | dB | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| SSS_RA | dB | | | 0 | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| $(\hat{E}_s / N_{oc})_{meas}$ Note 5 | dB | 1 | 1 | -Infinity | -4 |
| $(\hat{E}_s / N_{oc})_{ABS}$ | dB | 1 | 1 | N/A | N/A |
| RSRP Note 4,5 | dBm/15 kHz | -97 | -97 | -Infinity | -102 |
| SCH_RP Note 4 | dBm/15 kHz | -97 | -97 | -Infinity | -102 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 1 | -0.5 | -Infinity | -4 |
| SCH $\hat{E}_s / I_{ot}$ | dB | 1 | -0.5 | -Infinity | -7.5 |
| Propagation Condition | | ETU30 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSPP is estimated for Cell 2 during the restricted measurement subframes for neighbour cells. RSPP is estimated for Cell 1 during the PCell restricted subframes.

### A.8.1.7.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 2, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event-triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for the tested Event A3.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.8 E-UTRAN FDD-FDD Intra-Frequency Event-Triggered Reporting under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.8.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects and reports Event A3 (neighbour becomes offset better than PCell) defined in TS 36.331 [2] within the requirements specified in Clause 8.1.2.8.3, when the UE is provided with a time-domain measurement resource restriction pattern and CRS assistance information, and when non-MBSFN ABS configured in the interfering cells.

The test parameters are given in Tables A.8.1.8.1-1 and A.8.1.8.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A3 is used. In the test, there are three synchronous cells, Cell 1, Cell 2, and Cell 3, on the same RF channel. Cell 1 is the PCell. Cell 3 is the cell to be identified. A non-MBSFN ABS pattern is configured in each of the Cell 1 and Cell 2 during the entire test.The test consists of two successive time

periods with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information on Cell 3.

The UE is configured by higher layers with a time domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells, nsamely Cell 3 measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement patterns and the CRS assistance information shall be provided via RRC to the UE during T1.

**Table A.8.1.8.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| PCell | | Cell 1 | Also a first interfering cell to Cell 3. Active in T1 and T2. |
| Neighbour cells | | Cell 2 and Cell 3 | Cell 2 is a second interfering cell; Cell 2 is active in T1 and T2.<br>Cell 3 is the cell to be identified; Cell 3 is active only in T2. |
| ABS transmission configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For all cells in the test |
| A3-Offset | dB | -14 | |
| Event A3 measurement quantity | | RSRP | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | µs | Cell 2 offset with respect to Cell 1: 0<br>Cell 3 offset with respect to Cell 1: -2.5 | Three synchronous cells |
| T1 | S | 5 | |
| T2 | S | 5 | |
| Physical cell IDs | | ($PCI_{cell1}$ - $PCI_{cell3}$ )mod6 = 0<br>($PCI_{cell2}$ - $PCI_{cell3}$ )mod6 != 0<br>$PCI_{cell1}$ not equal to $PCI_{cell3}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | ‘10000000100000001000000010000000’ | FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Configured in Cell 1 and Cell 2 during T1. |
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | ‘10000000100000001000000010000000’ | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5.<br>Configured during T1 for Cell 3 measurements. The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time domain measurement resource restriction pattern for PCell measurements | | ‘01000000010000000100000001000000’ | Configured during T1 for Cell 1 measurements |
| physCellId | | see PCI conditions above | |

| | | | | |
|---|---|---|---|---|
| CRS assistance information | antennaPortsCount | | 1 | The CRS assistance information is provided for Cell 2 only in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *one Frame*='000000'. |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.8.1.8.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.5 FDD | | OP.6 FDD | | N/A | OP.6 FDD |
| PBCH_RA | dB | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | N/A | 0 |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| $(\hat{E}_s / N_{oc})$ | dB | 4 | 4 | 2 | 2 | -Infinity | -4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -96 | -96 | -Infinity | -102 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -96 | -96 | -Infinity | -102 |
| CRS $\hat{E}_s / I_{ot}$ Note 5 | dB | 4 | 2.54 | 2 | 0.54 | -Infinity | -9.46 |
| SCH $\hat{E}_s / I_{ot}$ | dB | -0.12 | -0.75 | -3.45 | -3.92 | -Infinity | -11.07 |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |

NOTE 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
NOTE 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
NOTE 4: RSRP, SCH_RP, and $\hat{E}_s / I_{ot}$ levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 5: Applies during the restricted measurement subframes configured for neighbour cell (Cell 3) measurements.

## A.8.1.8.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event-triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for the tested Event A3.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.9 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for 5MHz bandwidth

### A.8.1.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.1.1.1.

The parameters of this test are the same as defined in Subclause A.8.1.1.1 except that the values of the parameters in the Table A.8.1.9.1-1 will replace the values of the corresponding parameters in A.8.1.1.1-1, and the values of the parameters in the Table A.8.1.9.1-2 will replace the values of the corresponding parameters in A.8.1.1.1-2.

**Table A.8.1.9.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| Note 1: See Table A.8.1.1.1-1 for the other parameters.<br>Note 2: This test is according to the principle defined in section A.3.7.2. | | | |

**Table A.8.1.9.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for 5MHz**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | | OP.16 FDD | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: See Table A.8.1.1.1-2 for the other parameters. | | | | | |

### A.8.1.9.2 Test Requirements

The test requirements defined in section A.8.1.1.2 shall apply to this test case.

## A.8.1.10 E-UTRAN FDD-FDD Intra-Frequency Event Triggered Reporting under Fading Propagation Conditions in Synchronous Cells with DRX for 5 MHz Bandwidth

### A.8.1.10.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.1.2.2.1.2.

The parameters of this test are the same as defined in Section A.8.1.3.1 except that the values of the parameters in the Table A.8.1.10.1-1 will replace the values of the corresponding parameters in A.8.1.3.1-1, and the values of the parameters in the Table A.8.1.10.1-2 will replace the values of the corresponding parameters in A.8.1.3.1-2.

**Table A.8.1.10.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | | As specified in clause A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| NOTE 1: See Table A.8.1.3.1-1 for the other parameters.<br>NOTE 2: This test is according to the principle defined in Section A.3.7.2. | | | | |

**Table A.8.1.10.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | | OP.16 FDD | |
| NOTE 1: See Table A.8.1.3.1-2 for the other parameters. | | | | | |

### A.8.1.10.2 Test Requirements

The test requirements defined in Section A.8.1.3 shall apply to this test case.

## A.8.1.11 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category 0

### A.8.1.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.5.2.1.1.

The test parameters are given in Table A.8.1.11.1-1 and A.8.1.11.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.11.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -10 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | 5 | |

**Table A.8.1.11.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.3 | | R.14 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.1 | | R.7 FDD | | R.7 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.1.11.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.12 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0

### A.8.1.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.5.2.1.1

The test parameters are given in Table A.8.1.12.1-1 and A.8.1.12.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. PDCCHs indicating new transmissions or retransmissions should be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.12.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -10 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.12.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.3 | | R.14 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.1 | | R.7 FDD | | R.7 FDD | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
|---|---|---|---|---|---|
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.12.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.13 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX for UE category 0

### A.8.1.13.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.5.2.1.1.2.

The test parameters are given in Tables A.8.1.13.1-1, A.8.1.13.1-2, A.8.1.13.1-3 and A.8.1.13.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.13.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| A3-Offset | dB | -10 | | |
| CP length | | Normal | | |
| Hysteresis | dB | 0 | | |
| Time To Trigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| DRX | | ON | | DRX related parameters are defined in Table A.8.1.13.1-3 |
| Time offset between cells | | 3 µs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.1.13.11-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.3 | | R.14 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.1 | | R.7 FDD | | R.7 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -91 | -Infinity | -9 |
| SCH_RP Note 3 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.13.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.13.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.1.13.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.1.14 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category 0

## A.8.1.14.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.5.2.1.2.1.

The test parameters are given in Table A.8.1.14.1-1 and A.8.1.14.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.14.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -10 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.14.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.4 | | R.2 HD-FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.3 | | R.4 HD-FDD | | R.4 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.14.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.15 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0

### A.8.1.15.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.5.2.1.2.1

The test parameters are given in Table A.8.1.15.1-1 and A.8.1.15.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. PDCCHs indicating new transmissions or retransmissions should be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.1.15.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |

| | | | |
|---|---|---|---|
| A3-Offset | dB | -10 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.15.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.4 | | R.2 HD-FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.3 | | R.4 HD-FDD | | R.4 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.15.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.16 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX for UE category 0

### A.8.1.16.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.5.2.1.2.2.

The test parameters are given in Tables A.8.1.16.1-1, A.8.1.16.1-2, A.8.1.16.1-3 and A.8.1.16.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.16.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| A3-Offset | dB | -10 | | |
| CP length | | Normal | | |
| Hysteresis | dB | 0 | | |
| Time To Trigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| DRX | | ON | | DRX related parameters are defined in Table A.8.1.16.1-3 |
| Time offset between cells | | 3 μs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.1.16.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.4 | | R.2 HD-FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.3 | | R.4 HD-FDD | | R.4 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -91 | -91 | -Infinity | -94 |
| Propagation Condition | | ETU70 | | | |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.16.1-3: DRX-Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.16.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |

| | | | |
|---|---|---|---|
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.16.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.1.17 Void

## A.8.1.18 Void

## A.8.1.19 E-UTRAN FDD-FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0

### A.8.1.19.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.4.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.19.1-1 and A.8.1.19.1-2. PDCCHs indicating new transmissions should be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.1.19.1-1: General test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.15 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.7 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |

| | | | |
|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.1.19.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | OP.10 FDD | OP.10 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.1.19.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC\text{-}UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 210 ms at least 112 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 112 ACK/NACK number is caused by two parts. Firstly, at least 92 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.5.2.1.4. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 210 ms excludes 190 ms for identifying the cell global identifier of cell 2.

# A.8.1.20 E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0

## A.8.1.20.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.4. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.20.1-1, A.8.1.20.1-2, A.8.1.20.1-3 and A.8.1.20.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.1.20.1-1: General test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.15 FDD | As specified in clause A.3.1.1.3 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.7 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.6.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE should report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.1.20.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.20.1-3: DRX configuration for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.20.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.20.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC\text{-}UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.1.21 E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0

### A.8.1.21.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.5.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.21.1-1 and A.8.1.21.1-2. PDCCHs indicating new transmissions should be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.1.21.1-1: General test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.2 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.4 HD-FDD | As specified in clause A.3.1.2.3 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.1.21.1-2: Cell specific test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for UE category 0**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | OP.10 FDD | OP.10 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.21.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC\text{-}UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 210 ms at least 112 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 112 ACK/NACK number is caused by two parts. Firstly, at least 92 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.5.2.1.5. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 210 ms excludes 190 ms for identifying the cell global identifier of cell 2.

# A.8.1.22 E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0

## A.8.1.22.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.5. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.22.1-1, A.8.1.22.1-2, A.8.1.22.1-3 and A.8.1.22.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.1.22.1-1: General test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.2 HD-FDD | As specified in clause A.3.1.1.4 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.4 HD-FDD | As specified in clause A.3.1.2.3 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.6.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE should report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.1.22.1-2: Cell specific test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA | dB | -3 | | | -3 | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.22.1-3: DRX configuration for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.22.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for UE category 0**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.1.22.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC\text{-}UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.1.23 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

## A.8.1.23.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements for Cat-M1 UE in clause 8.13.2.1.1.1.

The test parameters are given in Table A.8.1.23.1-1 and A.8.1.23.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.23.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 1 | |
| T1 | | S | 5 | |
| T2 | | S | 5 | |

**Table A.8.1.23.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.21 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 FDD | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

### A.8.1.23.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.24 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

### A.8.1.24.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.13.2.1.1.1.

The test parameters are given in Table A.8.1.24.1-1 and A.8.1.24.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. MPDCCHs indicating new transmissions or retransmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.24.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.1.24.1-3 |
| A3 | Offset | dB | -6 | |

| | | | | |
|---|---|---|---|---|
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 1 | Gap offset of 14 is used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.8.1.24.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions for Cat-M1 UE in synchronous cells in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.33 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 FDD | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | µs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.1.24.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Comment | |
|---|---|---|
| | Value | |

| | | |
|---|---|---|
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1920 | |
| drx-RetransmissionTimer | psf16 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

### A.8.1.24.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88 s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.25 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

### A.8.1.25.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the FDD intra-frequency cell search in DRX requirements in clause 8.13.2.1.1.2.

The test parameters are given in Tables A.8.1.25.1-1, A.8.1.25.1-2, A.8.1.25.1-3 and A.8.1.25.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.25.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE when DRX is used**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1 | 1 | One radio channel is used. |
| Active cell | | | Cell 1 | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell 2 | Cell to be identified. |
| CP length | | | Normal | Normal | |
| DRX | | | ON | ON | DRX related parameters are defined in Table A.8.1.25.1-3 |
| A3 | Offset | dB | -6 | -6 | |
| | Hysteresis | dB | 0 | 0 | |
| | Time To Trigger | s | 0 | 0 | |
| Filter coefficient | | | 0 | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | 0 | |
| T1 | | s | 5 | 5 | |
| T2 | | s | 5 | 30 | |

**Table A.8.1.25.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.33 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 FDD | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.1.25.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.25.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.25.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.1.26 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

### A.8.1.26.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13.2.1.2.1.

The test parameters are given in Table A.8.1.26.1-1 and A.8.1.26.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.26.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test |
| Active Cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |

| | | | |
|---|---|---|---|
| Gap pattern ID | | 1 | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.1.26.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R. 25 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.7 HD-FDD | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -infinity | 4 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 4 | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.1.26.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.1.27 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

## A.8.1.27.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13.2.1.2.1.

The test parameters are given in Table A.8.1.27.1-1 and A.8.1.27.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. MPDCCHs indicating new transmissions or retransmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.27.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.1.27.1-3 |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.8.1.27.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.25 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.7 HD-FDD | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.1.27.1-3: DRX-Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Comment | |
|---|---|---|
| | Value | |
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1920 | |
| drx-RetransmissionTimer | psf16 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

### A.8.1.27.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.28 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

### A.8.1.28.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the HD-FDD intra-frequency cell search in DRX requirements in clause 8.13.2.1.2.2.

The test parameters are given in Tables A.8.1.28.1-1, A.8.1.28.1-2, A.8.1.28.1-3 and A.8.1.28.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of

two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.28.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1 | 1 | One radio channel is used for this test |
| Active cell | | | Cell 1 | Cell1 | |
| Neighbour cell | | | Cell 2 | Cell2 | Cell to be identified. |
| CP length | | | Normal | Normal | |
| DRX | | | ON | ON | DRX related parameters are defined in Table A.8.1.28.1-3 |
| A3 | Offset | dB | -6 | -6 | |
| | Hysteresis | dB | 0 | 0 | |
| | Time To Trigger | s | 0 | 0 | |
| Filter coefficient | | | 0 | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| T1 | | s | 5 | 5 | |
| T2 | | s | 5 | 35 | |

**Table A.8.1.28.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.25 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.7 HD-FDD | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |

| | | | | | |
|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | | |
| Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

**Table A.8.1.28.1-3: DRX-Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.28.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | 30 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.1.28.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 32 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.1.29 E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

## A.8.1.29.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeA makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 8.13.2.1.3.1.

The test parameters are given in Table A.8.1.29.1-1 and A.8.1.29.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.29.1-1: General test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Value | Comments |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap Pattern Id | | | 1 | |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.8.1.29.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.17 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.15 TDD | | R.15 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9 MHz | -64.76 | -62.42 | -64.76 | -62.42 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Time offset to Cell 1 | µs | - | | 3 | |

Note 1 OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.1.29.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88 second from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.30 E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

### A.8.1.30.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE in CEModeA makes correct reporting of an event in DRX. The tests will partly verify the TDD intra-frequency cell search in DRX requirements in clause 8.13.2.1.3.2.

The test parameters are given in Tables A.8.1.30.1-1, A.8.1.30.1-2, A.8.1.30.1-3 and A.8.1.30.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.30.1-1: General test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used for Cat-M1 UE in CEModeA**

| Parameter | Unit | Value | | Comments |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| E-UTRA RF Channel Number | | 1 | | One radio channel is used for both tests. |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |

| | | | | | |
|---|---|---|---|---|---|
| CP length | | | Normal | | |
| DRX | | | ON | | DRX related parameters are defined in Table A.8.1.30.1-3 |
| A3 | Offset | dB | -6 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | s | 0 | | |
| Special subframe configuration | | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | | 1 | | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap Pattern Id | | | 0 | | |
| T1 | | s | 5 | | |
| T2 | | s | 5 | 30 | |

**Table A.8.1.30.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used for Cat-M1 UE in CEModeA**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.17 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.15 TDD | | R.15 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9 MHz | -64.76 | -62.42 | -64.76 | -62.42 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Time offset to Cell 1 | µs | - | | 3 | |

Note 1 OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.1.30.1-3: DRX-Configuration for E-UTRAN TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.1.30.1-4: TimeAlignmentTimer-Configuration for E-UTRAN TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

### A.8.1.30.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 second from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25.6 second from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.1.31 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB

### A.8.1.31.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements for Cat-M1 UE in clause 8.13.3.1.1.1.

The test parameters are given in Table A.8.1.31.1-1 and A.8.1.31.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.31.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| T1 | | s | 5 | |
| T2 | | s | ≤325 | |

**Table A.8.1.31.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.23 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.11 FDD | | R.19 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.27 | -Infinity | -12.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.70 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

### A.8.1.31.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 320.8 s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.32 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB

### A.8.1.32.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.13.3.1.1.1.

The test parameters are given in Table A.8.1.32.1-1 and A.8.1.32.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. MPDCCHs indicating new transmissions or retransmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.32.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| T1 | | s | 5 | |
| T2 | | s | ≤325 | |

**Table A.8.1.32.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions for Cat-M1 UE in synchronous cells in CEModeB**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |

| | | | | | |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.23 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.19 FDD | | R.19 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.27 | -Infinity | -12.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.70 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | µs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.1.32.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 320.8 s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.1.33 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB

## A.8.1.33.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13.3.1.2.1.

The test parameters are given in Table A.8.1.33.1-1 and A.8.1.33.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.33.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test |
| Active Cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| T1 | | s | 5 | |
| T2 | | s | ≤325 | |

**Table A.8.1.33.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.13 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.9 HD-FDD | | R.9HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | -12 | -12 | -infinity | -12 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | -12 | -12.27 | -infinity | -12.27 |
| RSRP Note 3 | dBm/15 kHz | -110 | -110 | -infinity | -110 |
| SCH_RP Note 3 | dBm/15 kHz | -110 | -110 | -infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.70 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

### A.8.1.33.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 320.8s from the beginning of time period T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.34 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB

### A.8.1.34.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13.3.1.2.1.

The test parameters are given in Table A.8.1.34.1-1 and A.8.1.34.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.34.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |

| | | | |
|---|---|---|---|
| Gap pattern ID | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |

**Table A.8.1.34.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.13 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.9 HD-FDD | | R.9 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12.27 | -infinity | -12.27 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.70 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.1.34.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 320.8s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.1.35 E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB

## A.8.1.35.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE in CEModeB makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 8.13.3.1.3.1.

The test parameters are given in Table A.8.1.35.1-1 and A.8.1.35.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.1.35.1-1: General test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Value | Comments |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | One radio channel is used for this test. |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | s | 0 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap Pattern Id | | | 0 | |
| T1 | | s | 5 | |
| T2 | | s | ≤325 | |

**Table A.8.1.35.1-2: Cell specific test parameters for E-UTRAN TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | | |
| $BW_{channel}$ | MHz | 10 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.19 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 TDD | | R.17 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s/N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | -12 | -12.27 | -Infinity | -12.27 |
| RSRP Note 3 | dBm/15 kHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 kHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9 MHz | -69.95 | -69.70 | Specified in Cell 1 columns | Specified in Cell 1 columns |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Time offset to Cell 1 | µs | - | | 3 | |

Note 1 OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.1.35.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 323.2 seconds from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.36 E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB

### A.8.1.36.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.4.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.36.1-1 and A.8.1.36.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.1.36.1-1: General test parameters for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| CP length | | Normal | |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |

| | | | |
|---|---|---|---|
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤ 325 | |
| T3 | s | 7 | |

**Table A.8.1.36.1-2: Cell specific test parameters for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | R.23 FDD | | | N/A | | |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.19 FDD | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.21 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| MPDCCH_RA | dB | 0 | | | 0 | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| PBCH repetition | | | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | - | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.1.36.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5137 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_GI_CatM1,intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.1.37 E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB

### A.8.1.37.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.4. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.37.1-1 and A.8.1.37.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.1.37.1-1: General test parameters for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.37.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |
| T3 | s | 7 | |

**Table A.8.1.37.1-2: Cell specific test parameters for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 10 | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.4 | | R.23 FDD | | | N/A | | |
| MPDCCH Reference Channel in clause A.3.1.3.4 | | R.19 FDD | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.21 FDD | | | OP.6 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| MPDCCH_RA | dB | 0 | | | 0 | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| PBCH repetition | | | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | - | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.37.1-3: DRX configuration for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.37.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CeModeB**

| Field | Value | Comment |
|---|---|---|

| | | |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.1.37.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5120 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_GI_CatM1,intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.1.38 E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB

### A.8.1.38.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.5.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.38.1-1 and A.8.1.38.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.1.38.1-1: General test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |
| T3 | s | 7 | |

**Table A.8.1.38.1-2: Cell specific test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel in clause A.3.1.4.5 | | R.13 HD-FDD | | | N/A | | |
| MPDCCH Reference Channel in clause A.3.1.3.5 | | R.9 HD-FDD | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| MPDCCH_RA | dB | 0 | | | 0 | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| PBCH repetition | | | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.1.38.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5137 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_GI_CatM1,intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.1.39 E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB

## A.8.1.39.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.5. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.8.1.39.1-1 and A.8.1.39.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.1.39.1-1: General test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.39.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |
| T3 | s | 7 | |

**Table A.8.1.39.1-2: Cell specific test parameters for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH Reference Channel as specified in clause A.3.1.4.5 | | DL Reference Measurement Channel R.13 HD-FDD | | | N/A | | |
| MPDCCH Reference Channel as specified in clause A.3.1.3.5 | | DL Reference Measurement Channel R.9 HD-FDD | | | N/A | | |
| OCNG Patterns defined in A.3.2.1.21 (OP.21 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.21 FDD | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SSS_RA | dB | | | | | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_PB | dB | | | | | | |
| MPDCCH_RA | dB | 0 | | | 0 | | |
| MPDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | ms | - | | | 3 | | |
| PBCH repetition | | - | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | - | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.1.39.1-3: DRX configuration for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.39.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD - FDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.1.39.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5137 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_GI_CatM1,intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.1.40 E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag*

## A.8.1.40.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX when UE is configured with *highSpeedEnhancedMeasFlag*. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements for UE configured with *highSpeedEnhancedMeasFlag* in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.1.40.1-1, A.8.1.40.1-2, A.8.1.40.1-3 and A.8.1.40.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. At the same time, *highSpeedEnhancedMeasFlag* is broadcasted to UE. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.40.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.40.1-3 |
| T1 | s | 5 | |
| T2 | s | 30 | |

**Table A.8.1.40.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with highSpeedEnhancedMeasFlag**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |
| PDSCH parameters | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | - | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 1 | |
| Propagation Condition | | AWGN | | AWGN 1750Hz Note 4 | |
| Antenna Configuration | | 2x2 | | 2x2 | |
| Timing offset to Cell 1 Synchronous cells | us | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz.

**Table A.8.1.40.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.40.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.1.40.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12800 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.1.41 E-UTRAN FDD intra-frequency event triggered reporting for serving cell under fading propagation conditions for UE category M1 in CEModeA without gap

## A.8.1.41.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event for serving cell without using any measurement gaps.

UE is not configured with any reporting configuration that requires measurement on any intra-frequency neighbour cell.

This test will partly verify the FDD-FDD intra-frequency cell measurement requirements in clause 8.13.2.1.1.

The test parameters are given in Table A.8.1.41.1-1 and A.8.1.41.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A2 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. At the beginning of T2 the transmission power of cell 1 is decreased, and this shall result in reporting of Event A2.

**Table A.8.1.41.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | |
| Active cell | | | Cell 1 | |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A2 | Threshold | dB | -96 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| *Rmax* | | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | As defined in *mPDCCH-startSF-UESS* in [3] |
| T1 | | S | 5 | |
| T2 | | S | 5 | |

**Table A.8.1.41.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | R.21 FDD | |
| MPDCCH parameters:<br>DL Reference Measurement Channel | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |

| | | | |
|---|---|---|---|
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | -104 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | -3 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 19 | -3 |
| RSRP Note 3 | dBm/15 KHz | -85 | -107 |
| SCH_RP Note 3 | dBm/15 KHz | -85 | -107 |
| Io Note 3 | dBm/9MHz | -57.16 | -74.45 |
| Propagation Condition | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.1.41.2 Test Requirement

The UE shall send one Event A2 triggered measurement report, with a measurement reporting delay less than 480ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.1.42 E-UTRAN HD-FDD intra-frequency event triggered reporting for serving cell under fading propagation conditions for UE category M1 in CEModeA without gap

### A.8.1.42.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event for serving cell without using any measurement gaps.

UE is not configured with any reporting configuration that requires measurement on any intra-frequency neighbour cell.

This test will partly verify the HD-FDD intra-frequency measurement requirements in clause 8.13.2.1.2.

The test parameters are given in Table A.8.1.42.1-1 and A.8.1.42.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A2 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. At the beginning of T2 the transmission power of cell 1 is decreased below the threshold, and this shall result in reporting of Event A2.

**Table A.8.1.42.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | |
| Active cell | | | Cell 1 | |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A2 | Threshold | dB | -96 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |

| | | | |
|---|---|---|---|
| Filter coefficient | | 0 | L3 filtering is not used |
| *Rmax* | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | 1 | As defined in *mPDCCH-startSF-UESS* in [3] |
| T1 | S | 5 | |
| T2 | S | 5 | |

**Table A.8.1.42.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | R.11 HD-FDD | |
| MPDCCH parameters:<br>DL Reference Measurement Channel | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | -104 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | -3 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 19 | -3 |
| RSRP Note 3 | dBm/15 KHz | -85 | -107 |
| SCH_RP Note 3 | dBm/15 KHz | -85 | -107 |
| Io Note 3 | dBm/9MHz | -57.16 | -74.45 |
| Propagation Condition | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.1.42.2 Test Requirement

The UE shall send one Event A2 triggered measurement report, with a measurement reporting delay less than 480ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.1.43 E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16*

## A.8.1.43.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX when UE is configured with *highSpeedEnhMeasFlag2-r16*. The tests will partly verify the FDD-FDD intra-frequency cell search in DRX requirements for UE configured with *highSpeedEnhMeasFlag2-r16* in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.1.43.1-1, A.8.1.43.1-2, A.8.1.43.1-3 and A.8.1.43.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. At the same time, *highSpeedEnhMeasFlag2-r16* is broadcasted to UE. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.1.43.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.1.43.1-3 |
| T1 | s | 5 | |
| T2 | s | 30 | |

**Table A.8.1.43.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | |
| PDSCH parameters | | 5 MHz: R.5 FDD<br>10 MHz: R.0 FDD<br>20 MHz: R.4 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD<br>20 MHz: R.10 FDD | | - | |
| OCNG Patterns defined in A.3.2.1 | | 5 MHz: OP.15 FDD<br>10 MHz: OP.1 FDD<br>20 MHz: OP.11 FDD | | 5 MHz: OP.16 FDD<br>10 MHz: OP.2 FDD<br>20 MHz: OP.12 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 1 | |
| Propagation Condition | | AWGN | | AWGN 1944 Hz Note 4 | |
| Antenna Configuration | | 2x2 | | 2x2 | |
| Timing offset to Cell 1 Synchronous cells | us | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.

**Table A.8.1.43.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.1.43.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 [2] |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 [2] and section10.1 in TS 36.213 [3]. |

## A.8.1.43.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.2 E-UTRAN TDD Intra-frequency Measurements

## A.8.2.1 E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells

### A.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 8.1.2.2.2.1.

The test parameters are given in Table A.8.2.1.1-1 and A.8.2.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. PDCCHs indicating new transmissions or retransmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.2.1.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | 3 µs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.2.1.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PSS_RA | dB | 0 | | 0 | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| Propagation Condition | | ETU70 | | | |

Note 1 OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.2.2 E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX

### A.8.2.2.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. The tests will partly verify the TDD-TDD intra-frequency cell search in DRX requirements in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.1.3.1-1, A.8.1.3.1-2, A.8.1.3.1-3 and A.8.1.3.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.2.2.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| A3-Offset | dB | -6 | | |
| CP length | | Normal | | |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | | |
| Time To Trigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| DRX | | ON | | DRX related parameters are defined in Table A.8.2.2.1-3 |
| Time offset between cells | | 3 µs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.2.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.2.2.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.2.2.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

### A.8.2.2.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.2.3 E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.2.3.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.2.4.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.3.1-1 and A.8.2.3.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.2.3.1-1: General test parameters for E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | µs | 3 | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.2.3.1-2: Cell specific test parameters for E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.2.3.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 47 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 47 ACK/NACK number is caused by two parts. Firstly, at least 35 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement for UL/DL configuration #1 in Table 8.1.2.2.4.1-1 of Clause 8.1.2.2.4.1. Secondly, given that continuous DL data allocation, additional 12 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.2.4 E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX

### A.8.2.4.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.2.4. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.4.1-1, A.8.2.4.1-2, A.8.2.4.1-3 and A.8.2.4.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.2.4.1-1: General test parameters for E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.2.4.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | µs | 3 | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE shall report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.2.4.1-2: Cell specific test parameters for E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.8.2.4.1-3: DRX configuration for E-UTRAN TDD - TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.2.4.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD - TDD Intra frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.2.4.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.2.5 E-UTRAN TDD-TDD Intra-Frequency Event-Triggered Reporting under Time Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.8.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects and reports Event A3 (Neighbour becomes offset better than PCell) defined in TS 36.331 [2] within the requirements specified in Clause 8.1.2.8.2.1 under a time domain measurement resource restriction and non-MBSFN ABS configured in the aggressor cell.

The test parameters are given in Tables A.8.2.5.1-1 and A.8.2.5.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A3 is used. In the test there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. Cell 1 is the PCell, and it is also the aggressor cell to Cell 2. Cell 2 is the cell to be identified. The test consists of two successive time periods with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information on Cell 2.

Non-MBSFN ABS pattern is configured for Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency

measurements on neighbour cells. The UE is also configured with a time domain measurement resource restriction pattern for the PCell measurements. The information for both measurement patterns shall be provided to the UE via higher layers during T1.

**Table A.8.2.5.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| PCell | | Cell 1 | Also the aggressor cell. Active in T1 and T2 |
| Neighbour cell | | Cell 2 | Cell to be identified. Active only in T2. |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -11 | |
| Event A3 measurement quantity | | RSRP | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in Table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in Table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | | 3 µs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})mod6 != 0$ | Cell PCIs are selected so that the condition is met |
| ABS pattern | | '00000000010000000001' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1 during T1.<br>The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are cofigured in the ABS subframes. |
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00000000010000000001' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331, clause 6.3.5. Configured during T1 for Cell 2 measurements. |
| Time domain measurement resource restriction pattern for PCell measurements | | '10000000001000000000' | Configured during T1 for Cell 1 measurements |

**Table A.8.2.5.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |

| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
|---|---|---|---|---|---|
| PBCH_RA | dB | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| $(\hat{E}_s / N_{oc})_{meas}$ Note 5 | dB | 1 | 1 | -Infinity | -4 |
| $(\hat{E}_s / N_{oc})_{ABS}$ | dB | 1 | 1 | N/A | N/A |
| RSRP Note 4,5 | dBm/15 kHz | -97 | -97 | -Infinity | -102 |
| SCH_RP Note 4 | dBm/15 kHz | -97 | -97 | -Infinity | -102 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 1 | -0.5 | -Infinity | -4 |
| SCH $\hat{E}_s / I_{ot}$ | dB | 1 | -0.5 | -Infinity | -7.5 |
| Propagation Condition | | ETU30 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSPP is estimated for Cell 2 during the restricted measurement subframes for neighbour cells. RSPP is estimated for Cell 1 during the PCell restricted subframes.

### A.8.2.5.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 2, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event-triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for the tested Event A3.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.2.6 E-UTRAN TDD-TDD Intra-Frequency Event-Triggered Reporting under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.8.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects and reports Event A3 (neighbour becomes offset better than PCell) defined in TS 36.331 [2] within the requirements specified in Clause 8.1.2.8.4, when the UE is provided with a time-domain measurement resource restriction pattern and CRS assistance information, and when non-MBSFN ABS configured in the interfering cells.

The test parameters are given in Tables A.8.2.6.1-1 and A.8.2.6.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A3 is used. In the test, there are three synchronous cells, Cell 1, Cell 2, and Cell 3, on the same RF channel. Cell 1 is the PCell. Cell 3 is the cell to be identified. A non-MBSFN ABS pattern is configured in each of the Cell 1 and Cell 2 during the entire test.The test consists of two successive time periods with time duration of T1 and T2, respectively. During time duration T1, the UE shall not have any timing information on Cell 3.

The UE is configured by higher layers with a time domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells, nsamely Cell 3 measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement patterns and the CRS assistance information shall be provided via RRC to the UE during T1.

**Table A.8.2.6.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| PCell | | Cell 1 | Also a first interfering cell to Cell 3. Active in T1 and T2. |
| Neighbour cells | | Cell 2 and Cell 3 | Cell 2 is a second interfering cell; Cell 2 is active in T1 and T2.<br>Cell 3 is the cell to be identified; Cell 3 is active only in T2. |
| ABS transmission configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For all cells in the test |
| A3-Offset | dB | -14 | |
| Event A3 measurement quantity | | RSRP | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in Table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in Table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| Time offset between cells | µs | Cell 2 offset with respect to Cell 1: 0<br>Cell 3 offset with respect to Cell 1: -2.5 | Three synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Physical cell IDs | | $(PCI_{cell1} - PCI_{cell3})mod6 = 0$<br>$(PCI_{cell2} - PCI_{cell3})mod6 != 0$<br>$PCI_{cell1}$ not equal to $PCI_{cell3}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | '00000000010000000001' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Provided fto the UE for Cell 1 and Cell 2 during T1. |

| | | | | |
|---|---|---|---|---|
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | | '00000000010000000001' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5. Provided to the UE during T1 for Cell 3 measurements. The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time domain measurement resource restriction pattern for PCell measurements | | | '10000000001000000000' | Configured during T1 for Cell 1 measurements |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 only in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *one Frame*='000000'. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.8.2.6.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | | N/A | OP.2 TDD |
| PBCH_RA | dB | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | | N/A | 0 |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| $(\hat{E}_s / N_{oc})$ | dB | 4 | 4 | 2 | 2 | -Infinity | -4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -96 | -96 | -Infinity | -102 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -96 | -96 | -Infinity | -102 |
| CRS $\hat{E}_s / I_{ot}$ Note 5 | dB | 4 | 2.54 | 2 | 0.54 | -Infinity | -9.46 |
| SCH $\hat{E}_s / I_{ot}$ | dB | -0.12 | -0.75 | -3.45 | -3.92 | -Infinity | -11.07 |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |

NOTE 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
NOTE 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
NOTE 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
NOTE 4: RSRP, SCH_RP, and $\hat{E}_s/I_{ot}$ levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
NOTE 5: Applies during the restricted measurement subframes configured for neighbour cell (Cell 3) measurements.

### A.8.2.6.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event-triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for the tested Event A3.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.2.7 E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.2.7.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.6.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.7.1-1 and A.8.2.7.1-2. PDCCHs indicating new transmissions should be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.2.7.1-1: General test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.13 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.7 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -3 | |

| | | | |
|---|---|---|---|
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.2.7.1-2: Cell specific test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.2.7.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC-UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 210 ms at least 66 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 66 ACK/NACK number is caused by two parts. Firstly, at least 54 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement for UL/DL configuration #1 in Table 8.1.2.2.4.1-1 of Clause 8.1.2.2.4.1. Secondly, given that continuous DL data allocation, additional 12 ACK/NACK shall be sent from the start of T3 until 210 ms excludes 190 ms for identifying the cell global identifier of cell 2.

## A.8.2.8 E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX

### A.8.2.8.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.5.2.1.6. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.8.1-1, A.8.2.8.1-2, A.8.2.8.1-3 and A.8.2.8.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.2.8.1-1: General test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.13 TDD | As specified in clause A.3.1.1.5 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.7 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -3 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.2.4.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE should report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.2.8.1-2: Cell specific test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | | 2x1 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | 11 | 11 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.2.8.1-3: DRX configuration for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.2.8.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD Intra frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |

| | | |
|---|---|---|
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.2.8.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 210 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_LC-UE,\ intra}$ + reporting delay

= 15 + 190 + 2ms from the start of T3

= 207 ms, allow 210 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.2.9 E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB

### A.8.2.9.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.6.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.9.1-1 and A.8.2.9.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.2.9.1-1: General test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |
| T3 | s | 7 | |

**Table A.8.2.9.1-2: Cell specific test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH reference measurement channel as specified in clause A.3.1.4.6 | | DL Reference Measurement Channel R.19 TDD | | | N/A | | |
| MPDDCH reference channel as specified in clause A.3.1.3.6 | | DL Reference Measurement Channel R.16 TDD | | | N/A | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.11 TDD | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Propagation Condition | | AWGN | | | | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Timing offset to Cell 1 | µs | - | | | 3 | | |
| PBCH repetition | | - | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | - | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.2.9.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5137 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI_Cat\ M1,\ intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.2.10 E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB

### A.8.2.10.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.13.3.1.6. The requirement is verified in a DRX configuration.

The test scenario comprises of one E-UTRA TDD carrier and two cells as given in tables A.8.2.10.1-1 and A.8.2.10.1-2. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on NPUSCH.

**Table A.8.2.10.1-1: General test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -16 | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.2.8.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤325 | |
| T3 | s | 7 | |

**Table A.8.2.10.1-2: Cell specific test parameters for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| PDSCH reference channel as specified in clause A.3.1.4.6 | | R.19 TDD | | | N/A | | |

| MPDCCH reference channel as specified in clause A.3.1.3.6 | | R.16 TDD | | | N/A | | |
|---|---|---|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.2.11 (OP.11 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.11 TDD | OP.11 TDD | OP.11 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | 0 | | | 0 | | |
| PHICH_RA | dB | -3 | | | -3 | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | 0 | | | 0 | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | -3 | | | -3 | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | -Infinity | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | 8 | 6.24 | 6.24 | -Infinity | -11.64 | -11.64 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | -101 | -101 |
| Io Note 3 | dBm/9MHz | -61.58 | -61.29 | -61.29 | Specified in columns for Cell 1 | | |
| Antenna Configuration | | 2x1 | | | 2x1 | | |
| Propagation Condition | | AWGN | | | | | |
| Timing offset to Cell 1 | μs | - | | | 3 | | |
| PBCH repetition | | - | | | Configured as specified in TS 36.211 [16] | | |
| SIB1-BR repetition level | | - | | | 16 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.2.10.1-3: DRX configuration for E-UTRAN TDD Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.2.10.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD Intra frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX for Cat-M1 UE in CEModeB**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.2.10.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 5137 ms from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_C\ GI_Cat\ M1,\ intra}$ + reporting delay

= 15 + 5120 + 2ms from the start of T3

= 5137 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.2.11 E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag*

### A.8.2.11.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX when UE is configured with *highSpeedEnhancedMeasFlag*. The tests will partly verify the TDD-TDD intra-frequency cell search in DRX requirements for UE configured with *highSpeedEnhancedMeasFlag* in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.2.11.1-1, A.8. 2.11.1-2, A.8. 2.11.1-3 and A.8. 2.11.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. At the same time, *highSpeedEnhancedMeasFlag* is broadcasted to UE. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.2.11.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.2.11.1-3 |
| T1 | s | 5 | |
| T2 | s | 30 | |

**Table A.8.2.11.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH parameters: | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | - | |
| OCNG Pattern defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.10 TDD<br>10MHz:OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 1 | |
| Propagation Condition | | AWGN | | AWGN 1750Hz Note 4 | |
| Antenna Configuration | | 2x2 | | 2x2 | |
| Timing offset to Cell 1 Synchronous cells | us | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1750Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750Hz.

**Table A.8.2.11.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.2.11.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhancedMeasFlag***

| Field | Value | Comment |
|---|---|---|

| | | |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 [2] |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 [2] and clause 10.1 in TS 36.213 [3]. |

### A.8.2.11.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12800 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.2.12 E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0

### A.8.2.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test case is applicable to UE category 0 as defined in Section 3.1. This test will partly verify the TDD intra-frequency cell search requirements in clause 8.5.2.1.3.1.

The test parameters are given in Table A.8.2.12.1-1 and A.8.2.12.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. PDCCHs indicating new transmissions or retransmissions should be sent continuously to ensure that the UE would not enter the DRX state. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.2.12.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| A3-Offset | dB | -10 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | DRX_L | As specified in clause A.3.3 |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.2.12.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for UE category 0**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.5 | | R.13 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.2 | | R.7 TDD | | R.7 TDD | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -91 | -91 | -Infinity | -94 |
| $\hat{E}_s/I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| SCH_RP Note 4 | dBm/15 kHz | -91 | -91 | -Infinity | -94 |
| $\hat{E}_s/N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | ETU70 | |

Note 1 OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.2.12.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.2.13 E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells with DRX for UE category 0

### A.8.2.13.1 Test Purpose and Environment

The purpose of the two tests is to verify that the UE makes correct reporting of an event in DRX. This test case is applicable to UE category 0 as defined in Section 3.1. The tests will partly verify the TDD-TDD intra-frequency cell search in DRX requirements in clause 8.5.2.1.3.2.

The test parameters are given in Tables A.8.2.13.1-1, A.8.2.13.1-2, A.8.2.13.1-3 and A.8.2.13.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.2.13.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used for UE category 0**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Active cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| A3-Offset | dB | -10 | | |
| CP length | | Normal | | |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | | |
| Time To Trigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| DRX | | ON | | DRX related parameters are defined in Table A.8.2.13.1-3 |
| Time offset between cells | | 3 μs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.2.13.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells when DRX is used for UE category 0**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 2x1 | | 2x1 | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel defined in A.3.1.1.5 | | R.13 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel defined in A.3.1.2.2 | | R.7 TDD | | R.7 TDD | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -91 | -91 | -Infinity | -94 |
| $\hat{E}_s / I_{ot}$ | dB | 7 | 1.54 | -Infinity | -3.79 |
| SCH_RP Note 3 | dBm/15 kHz | -91 | -91 | -Infinity | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 7 | 7 | -Infinity | 4 |
| Io Note 4 | dBm/9MHz | -62.43 | -60.91 | Specified in Cell 1 columns | |
| Propagation Condition | | ETU70 | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.2.13.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for UE category 0**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.2.13.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for UE category 0**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |

| | | | |
|---|---|---|---|
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

### A.8.2.13.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1000 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.2.14 E-UTRAN TDD intra-frequency event triggered reporting for serving cell under fading propagation conditions for UE category M1 in CEModeA without gap

### A.8.2.14.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event for serving cell without using any measurement gaps.

UE is not configured with any reporting configuration that requires measurement on any intra-frequency neighbour cell.

This test will partly verify the TDD intra-frequency measurement requirements in clause 8.13.2.1.3.

The test parameters are given in Table A.8.2.14.1-1 and A.8.2.14.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A2 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. At the beginning of T2 the transmission power of cell 1 is decreased below the threshold, and this shall result in reporting of Event A2.

**Table A.8.2.14.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | |
| Active cell | | | Cell 1 | |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A2 | Threshold | dB | -96 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| *Rmax* | | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | As defined in *mPDCCH-startSF-UESS* in [3] |
| T1 | | S | 5 | |
| T2 | | S | 5 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |

**Table A.8.2.14.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.17 TDD | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.15 TDD | |
| OCNG Patterns | | OP.11 TDD | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | -104 |
| $\hat{E}_s / N_{oc}$ | dB | 19 | -3 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 19 | -3 |
| RSRP Note 3 | dBm/15 KHz | -85 | -107 |
| SCH_RP Note 3 | dBm/15 KHz | -85 | -107 |
| Io Note 3 | dBm/9MHz | -57.16 | -74.45 |
| Propagation Condition | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.2.14.2 Test Requirement

The UE shall send one Event A2 triggered measurement report, with a measurement reporting delay less than 480ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.2.15 E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16*

## A.8.2.15.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX when UE is configured with *highSpeedEnhMeasFlag2-r16*. The tests will partly verify the TDD-TDD intra-frequency cell search in DRX requirements for UE configured with *highSpeedEnhMeasFlag2-r16* in clause 8.1.2.2.1.2.

The test parameters are given in Tables A.8.2.15.1-1, A.8.2.15.1-2, A.8.2.15.1-3 and A.8.2.15.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. At the same time, *highSpeedEnhMeasFlag2-r16* is broadcasted to UE. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.2.15.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16]. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16]. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.2.11.1-3 |
| T1 | s | 5 | |
| T2 | s | 30 | |

**Table A.8.2.15.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | | 5 MHz: NRB,c = 25<br>10 MHz: NRB,c = 50<br>20 MHz: NRB,c = 100 | |
| PDSCH parameters: | | 5 MHz: R.4 TDD<br>10 MHz: R.0 TDD<br>20 MHz: R.3 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: | | 5 MHz: R.11 TDD<br>10 MHz: R.6 TDD<br>20 MHz: R.10 TDD | | - | |
| OCNG Pattern defined in A.3.2.2 | | 5 MHz: OP.9 TDD<br>10 MHz: OP.1 TDD<br>20 MHz: OP.7 TDD | | 5 MHz: OP.10 TDD<br>10 MHz:OP.2 TDD<br>20 MHz: OP.8 TDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PHICH_RA | dB | -3 | | -3 | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 1 | |
| Propagation Condition | | AWGN | | AWGN 1944 Hz Note 4 | |
| Antenna Configuration | | 2x2 | | 2x2 | |
| Timing offset to Cell 1 Synchronous cells | us | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The AWGN 1944 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1944 Hz.

**Table A.8.2.15.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.2.15.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting with DRX for UE configured with *highSpeedEnhMeasFlag2-r16***

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 [2] |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 [2] and clause 10.1 in TS 36.213 [3]. |

## A.8.2.15.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.3 E-UTRAN FDD - FDD Inter-frequency Measurements

## A.8.3.1 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells

### A.8.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.3.1.1-1 and A.8.3.1.1-2. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.3.1.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.3.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.3.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.2 E-UTRAN FDD-FDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells

### A.8.3.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These test will partly verify the FDD-FDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.

The common test parameters are given in Tables A.8.3.2.1-1 and A.8.3.2.1-2. DRX configuration for Test1 and Test2 are given in Table A.8.3.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.3.2.1-4. In this tests, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The tests consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.3.2.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1 Note that UE may only be allocated at *On Duration* |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1. |
| E-UTRA RF Channel Number | | 1, 2 | | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Active cell | | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | | |
| Hysteresis | dB | 0 | | |
| CP length | | Normal | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.3.2.1-3 |
| Time offset between cells | | 3 ms | | Asynchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.3.2.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |

| | | | | | |
|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

**Table A.8.3.2.1-3: drx-Configuration to be used in E-UTRAN FDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

**Table A.8.3.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN FDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213.. |

### A.8.3.2.2 Test Requirements

In Test1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 20*1280ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report

## A.8.3.3 E-UTRAN FDD-FDD inter-frequency event triggered reporting under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used

### A.8.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX when L3 filtering is used. This test will partly verify the FDD-FDD inter-frequency cell search in DRX requirements in clause 8.1.2.3.1.2 and the UE behaviour with the *filterCoefficent* defined in TS 36.331 [2].

The test parameters are given in Tables A.8.3.3.1-1, A.8.3.3.1-2, A.8.3.3.1-3 and A.8.3.3.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 and the filter coefficient is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 1 as defined in Table 8.1.2.1-1 is provided.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.3.3.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Neighbour A3-Offset Ofn | dB | -14 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 9 | L3 filtering is used |
| DRX | | ON | DRX related parameters are defined in Table A.8.3.3.1-3 |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | S | 30 | |
| T2 | S | 9 | |

**Table A.8.3.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 24 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 24 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -74 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -74 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.3.3.1-3: DRX-Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting in DRX under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.3.3.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting in DRX under AWGN propagation conditions in asynchronous cells with DRX when L3 filtering is used**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.3.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.3.4 E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.3.4.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.5.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.8.3.4.1-1 and A.8.3.4.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.3.4.1-1: General test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF channel number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |

| | | | |
|---|---|---|---|
| T3 | s | 5 | |

**Table A.8.3.4.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | OP.10 FDD | OP.10 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.3.4.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_C\ GI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.3.5.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.3.5 E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.5. The requirement is verified in a DRX configuration.

The test scenario comprises of two E-UTRA FDD carriers and one cell on each carrier as given in tables A.8.3.5.1-1, A.8.3.5.1-2, A.8.3.5.1-3 and A.8.3.5.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.3.5.1-1: General test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF channel number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.3.5.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE shall report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.3.5.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD | OP.2 FDD | OP.2 FDD | OP.2 FDD |
| PBCH_RA | dB | | | | | | |
| PBCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA | dB | 0 | | | 0 | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.3.5.1-3: DRX configuration for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.3.5.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.3.5.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_C\ GI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.3.6 E-UTRAN FDD-FDD Inter-frequency event triggered reporting without measurement gaps under AWGN propagation conditions in asynchronous cells

### A.8.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event without measurement gaps. This test will partly verify the FDD-FDD inter-frequency cell search requirements in section 8.1.2.3.

The test parameters are given in Tables A.8.3.6.1-1 and A.8.3.6.1-2. In this test, there are two cells on different carrier frequencies and no gaps are configured in this test. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. PDCCH on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.3.6.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting without measurement gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.3.6.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting without measurement gaps**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.3.6.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall send continuous ACK/NACK throughout the test, and from the start of T2 until Event A3 is reported, at least 85% ACK/NACK shall be detected.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.7 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Increased Carrier Monitoring without Reduced Performance Group

### A.8.3.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.3.1.1-1 and A.8.3.1.1-2. In this test, there are four cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cells 2, 3 or 4.

**Table A.8.3.7.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight FDD carrier frequencies are used in the UE neighbour cell list. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cells | | Cell 2, Cell 3, Cell 4 | Cells 2, 3, 4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |

| | | | |
|---|---|---|---|
| Hysteresis | dB | 0 | |
| Reduced Performance Group Scaling factor | - | 8 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| T1 | s | 5 | |
| T2 | s | 40 | |

**Table A.8.3.7.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells (Cell # 1 and Cell # 2)**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4,5,6,7,8 such that cell 2 is in the normal performance group | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27 | | 5MHz: 10-15<br>10MHz: 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD | | - | |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36 | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| Io Note 4 | dBm/ $BW_{channel}$ | -64.76+10log($N_{RB,C}$/50) | -64.76+10log($N_{RB,C}$/50) | -70.22+10log($N_{RB,C}$/50) | -62.43+10log($N_{RB,C}$/50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to cell 1 | ms | - | | 3 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. |
| Note 4: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.8.3.7.1-3: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells (Cell # 3 and Cell # 4)**

| Parameter | Unit | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | Randomly selected from 2,3,4,5,6,7,8 such that cell 3 is in the normal performance group | | Randomly selected from 2,3,4,5,6,7,8 such that cell 4 is in the normal performance group | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27 | | 5MHz: 10-15<br>10MHz: 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | - | | - | |
| PDSCH allocation | $n_{PRB}$ | - | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| Io Note 4 | dBm/ $BW_{channel}$ | -70.22+10log($N_{RB,c}$/50) | -62.43+10log($N_{RB,c}$/50) | -70.22+10log($N_{RB,c}$/50) | -62.43+10log($N_{RB,c}$/50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to cell 1 | ms | 3 | | 3 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. |
| Note 4: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.8.3.7.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 30.72s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.8 FDD-FDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell measurement requirements for increased UE carrier monitoring in clause 8.1.2.3.

The test parameters are given in Tables A.8.3.8.1-1, A.8.3.8.1-2 and A.8.3.8.1-3. In this test, there are 4 cells on different carrier frequencies and gap pattern configuration #0 as defined in table A.8.3.8.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Events A3 is used. The test consists of two successive time periods for every repetition, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of neighoubour cells. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.3.8.1-1: General test parameters for FDD-FDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1,2,3,4,5,6,7,8,9 | Serving cell and 8 FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test equipment configuration | | Cell 1 uses E-UTRA RF cannel number 1<br>Cell 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 | Cell 1 uses E-UTRA RF channel number 1<br>Cell 2 is randomly selected to use different frequencies selected from E-UTRA frequencies 2, 3, 4.<br>Cells 3, 4 are randomly selected to use different frequencies selected from E-UTRA frequencies 5, 6, 7, 8, 9. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Scaling factor configurations | | 8 | As specified in TS 36.133 clause 8.1.2.1.1a |

| | | | |
|---|---|---|---|
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.3.8.1-2: Cell specific test parameters for FDD-FDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX (cell #1, cell #2)**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| PDSCH parameters: DL Reference Measurement Channel As specified in clause A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz:R.0 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel As specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1, A.3.2.1.2 ,A.3.2.1.15 and A.3.2.1.16 | | 5MHz: OP.15 FDD<br>10MHz:OP.1 FDD | | 5MHz: OP.16.FDD<br>10MHz:OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| Io Note 4 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | |
| Timing offset to Cell 1 | | - | | 3ms | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.3.8.1-3: Cell specific test parameters for FDD-FDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX (cell #3, cell #4)**

| Parameter | Unit | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | **Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group** | | **Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group. Cell 4 RF channel is different from Cell 3 RF channel.** | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| PDSCH parameters: DL Reference Measurement Channel As specified in clause A.3.1.1.1 | | - | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel As specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.2 and A.3.2.1.16 | | 5MHz: OP.16.FDD<br>10MHz:OP.2 FDD | | 5MHz: OP.16.FDD<br>10MHz:OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | **-98** | | **-98** | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -Infinity | 7 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| Io Note 4 | dBm/Ch BW | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | |
| Timing offset to Cell 1 | | 3ms | | 3ms | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.3.8.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 13.17s (cell 2) and 153.6s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

## A.8.3.9 FDD-FDD Inter-frequency correct reporting of measurement events with reduced performance group configured, DRX

### A.8.3.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX. This test will partly verify the FDD-FDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.

The test parameters are given in Tables A.8.3.9.1-1, A.8.3.9.1-2, A.8.3.9.1-3 and A.8.3.9.1-4. In this test, there are four cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

The UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle..

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods for every repetition, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2, 3 or 4. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells on different frequencies which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.3.9.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting for IncMon**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test equipment configuration | | Cell 1,2,3,4 | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2 are randomly selected to use different frequencies selected from E-UTRA frequencies 2, 3, 4.<br>Cells 3, 4 are randomly selected to use different frequencies selected from E-UTRA frequencies 5, 6, 7, 8, 9. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cells | | Cell 2,3,4 | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -5 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.3.9.1-3 |
| Scaling factor for reduced performance group | | 8 | |
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.3.9.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting for IncMon**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | Randomly selected from 5, 6, 7, 8, 9 such that cell 3 is in the reduced performance group | | Randomly selected from 5, 6, 7, 8, 9 such that cell 4 is in the reduced performance group | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5MHz: NRB = 25<br>10MHz: NRB = 50 | | 5MHz: NRB,= 25<br>10MHz: NRB,= 50 | | 5MHz: NRB = 25<br>10MHz: NRB = 50 | | 5MHz: NRB,= 25<br>10MHz: NRB,= 50 | |
| PDSCH parameters as specified in clause A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD | | - | | - | | - | |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 | -Infinity | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 4 | 4 | -Infinity | 4 | -Infinity | 4 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 | -Infinity | -94 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 | -Infinity | -94 | -Infinity | -94 |
| Io Note 4 | dBm/Ch BW | -64.76+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | | 1x2 | | 1x2 | |
| Time offset to cell1 | ms | - | | 3 | | 3 | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: $E_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.3.9.1-3: *drx-Configuration* to be used in E-UTRAN FDD-FDD inter-frequency event triggered reporting when DRX is used for IncMon**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf160 | |
| shortDRX | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

**Table A.8.3.9.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* Configuration to be used in E-UTRAN FDD-FDD inter-frequency event triggered reporting when DRX is used for IncMon**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213.. |

## A.8.3.9.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 13.2s (cell 2) and 153.6s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

Where:

When DRX cycle is 160ms, the delay requirement of cell identification and measurement period are specified in section 8.1.2.3.1.2 and Non DRX Requirements in clause 8.1.2.3.1.1 are applicable.

The requirement of inter frequency cell identification delay are specified as

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n} \cdot K_n \quad ms \text{ (normal performance) and}$$

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r} \cdot K_r \quad ms \text{ (reduced performance)}$$

$T_{Basic_Identify_inter}$ 480ms, See section 8.1.2.3.1.1

$T_{Inter1}$ 60ms, See section 8.1.2.1

$N_{freq,n}$ and $N_{freq,r}$ 3 and 5 set in this test case.

$K_n$ and $K_r$ 8/7 and 8, See section 8.1.2.1.1a.

This gives 13165.7ms for cells 2 on normal carrier, and 153600ms for cell 3 and cell 4 on reduced carriers for Event A3 triggered measurement reporting delay. The test requirements allow 13.2s and 153.6s.

# A.8.3.10 E-UTRAN FDD-FDD Inter-frequency event triggered reporting with MGL=3ms under fading propagation conditions in synchronous cells

## A.8.3.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event with MGL=3ms when Gap pattern configuration #2 is configured. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.3.10.1-1 and A.8.3.10.1-2. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 2 as defined in Table 8.1.2.1-1 is provided. Time offset between frame boundaries of two cells has to be chosen such that the #0 or #5 subframes of the target cell is 500uS early relative to the 2nd subframe of the measurement gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.3.10.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 2 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.3.10.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.3.10.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.11 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells with burst gap

### A.8.3.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3, when configured with the burst gap.

The test parameters are given in Table A.8.3.11.1-1 and A.8.3.11.1-2. In this test, there are two cells on different carrier frequencies and non-uniform gap pattern configuration #1 as defined in Table 8.1.2.1-2 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.3.11.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting with burst gap in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |

| | | | |
|---|---|---|---|
| Gap Pattern Id | | nonUniform1 | As specified in TS 36.133 clause 8.1.2.1. |
| A4 Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| A4 Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| A4 Time To Trigger | s | 0 | |
| CP length | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 15 | |

**Table A.8.3.11.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting with burst gap under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | 16 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -Infnity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | -Infinity | 7 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.3.11.2 Test Requirement

The UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. During the test, downlink traffic is continuously scheduled From the start of T1

until the measurement report is received during T2, at least [100]% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.12 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeA

### A.8.3.12.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.13.2.6.1.

The test parameters are given in Table A.8.3.12.1-1 and A.8.3.12.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.3.12.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| *Rmax* | | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 10 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | |
| T2 | | S | 5 | |

**Table A.8.3.12.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.21 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 FDD | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RB | dB | -3 | | -3 | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.3.12.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3.2 s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.13 E-UTRAN HD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeA

### A.8.3.13.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the HD-FDD inter-frequency cell search requirements in clause 8.13.2.6.2.

The test parameters are given in Table A.8.3.13.1-1 and A.8.3.13.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.3.13.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| *Rmax* | | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 10 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | |
| T2 | | S | 5 | |

**Table A.8.3.13.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.11 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.7 HD-FDD | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

### A.8.3.13.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3.2 s from the beginning of time period T2. During the test, downlink traffic is continuously scheduled.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.3.14 E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeB

### A.8.3.14.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.13.3.5.1.

The test parameters are given in Table A.8.3.14.1-1 and A.8.3.14.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.3.14.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| *Rmax* | | | 128 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 8 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme01 | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | |
| T2 | | S | ≤825 | |

**Table A.8.3.14.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | |
| PDSCH parameters: DL Reference Measurement Channel | | R.23 FDD for 10 MHz cell BW<br>R.31 FDD for 5 MHz cell BW | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.19 FDD for 10 MHz cell BW<br>R.27 FDD for 10 MHz cell BW | | R.19 FDD for 10 MHz cell BW<br>R.27 FDD for 10 MHz cell BW | |
| OCNG Patterns | | OP.21 FDD for 10 MHz cell BW<br>OP.22 FDD for 5 MHz cell BW | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| | dBm/4.5 MHz | -72.96 | -72.96 | -Infinity | -72.96 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.3.14.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [819.2] s from the beginning of time period T2 which is derived from section 8.13.3.5.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured

## A.8.3.15 E-UTRAN HD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeB

### A.8.3.15.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the HD-FDD inter-frequency cell search requirements in clause 8.13.3.5.2.

The test parameters are given in Table A.8.3.15.1-1 and A.8.3.15.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

During the test, downlink traffic is continuously scheduled. MPDCCH is not collided with gap.

**Table A.8.3.15.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| *Rmax* | | | 128 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 8 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme01 | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | |
| T2 | | S | ≤825 | |

**Table A.8.3.15.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW<br>5 for 5 MHz cell BW | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | |
| PDSCH parameters: DL Reference Measurement Channel | | R.13 HD-FDD for 10 MHz cell BW<br>R.21 HD-FDD for 5 MHz cell BW | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.9 HD-FDD for 10 MHz cell BW<br>R.17 HD-FDD for 5 MHz cell BW: | | R.9 HD-FDD for 10 MHz cell BW:<br>R.17 HD-FDD for 5 MHz cell BW: | |

| OCNG Patterns | | OP.21 FDD for 10 MHz cell BW<br>OP.22 FDD for 5 MHz cell BW | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | |
|---|---|---|---|---|---|
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| | dBm/4.5 MHz | -72.96 | -72.96 | -Infinity | -72.96 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.3.15.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 819.2 s from the beginning of time period T2 which is derived from section 8.13.3.5.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured

## A.8.3.16 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeA when DRX is used

### A.8.3.16.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event for inter-frequency. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.13.2.6.1.

The test parameters are given in Table A.8.3.16.1-1, A.8.3.16.1-3 and A.8.3.16.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.3.16.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -6 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | | |
| T2 | | S | 10 | 60 | |

**Table A.8.3.16.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.21 FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 FDD | | R.17 FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.3.16.1-3: DRX-Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.3.16.1-4: *TimeAlignmentTimer* -Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.3.16.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6.4 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 51.2 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

# A.8.3.17 E-UTRAN HD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeA in DRX

## A.8.3.17.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD inter-frequency cell search requirements in clause 8.13.2.6.2.

The test parameters are given in Table A.8.3.17.1-1, A.8.3.17.1-2, A.8.3.17.1-3 and A.8.3.13.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.3.17.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -6 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | | |
| T2 | | S | 10 | 60 | |

**Table A.8.3.17.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.11 HD-FDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.7 HD-FDD | | R.7 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | | OP.6 FDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH_RB | dB | -3 | | -3 | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.3.17.1-3: DRX-Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.3.17.1-4: *TimeAlignmentTimer* -Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.3.17.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6.4 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 51.2 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the r

# A.8.3.18 E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeB in DRX

## A.8.3.18.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.13.3.5.1.

The test parameters are given in Table A.8.3.18.1-1, A.8.3.18.1-2, A.8.3.18.1-3 and A.8.3.18.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.3.18.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -8 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme01 | | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | | |
| T2 | | S | ≤650 | ≤1030 | |

**Table A.8.3.18.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | | 10 for 10 MHz cell BW:<br>5 for 5 MHz cell BW | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | R.23 FDD for 10 MHz cell BW<br>R.31 FDD for 5 MHz cell BW | | - | |

| | | | | | |
|---|---|---|---|---|---|
| MPDCCH parameters: DL Reference Measurement Channel | | R.19 FDD for 10 MHz cell BW<br>R.27 FDD for 5 MHz cell BW | | R.19 FDD for 10 MHz cell BW<br>R.27 FDD for 5 MHz cell BW | |
| OCNG Patterns | | OP.21 FDD for 10 MHz cell BW<br>OP.22 FDD for 5 MHz cell BW | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| | dBm/4.5 MHz | -72.96 | -72.96 | -Infinity | -72.96 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.3.18.1-3: DRX-Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.3.18.1-4: *TimeAlignmentTimer* -Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.3.18.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 641.6 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1024 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.3.19 E-UTRAN HD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeB in DRX

### A.8.3.19.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD inter-frequency cell search requirements in clause 8.13.3.5.2.

The test parameters are given in Table A.8.3.19.1-1, A.8.3.19.1-2, A.8.3.19.1-3 and A.8.3.19.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.3.19.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | T1 | T2 | |
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -8 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |

| | | | | |
|---|---|---|---|---|
| *X* | | scheme01 | | As defined in *measGapSharingScheme* in [3] |
| T1 | S | 5 | | |
| T2 | S | ≤650 | ≤1030 | |

**Table A.8.3.19.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 for 10 MHz cell BW<br>5 for 5 MHz cell BW | | 10 for 10 MHz cell BW<br>5 for 5 MHz cell BW | |
| PDSCH parameters: DL Reference Measurement Channel | | R.13 HD-FDD for 10 MHz cell BW<br>R.21 HD-FDD for 5 MHz cel | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.9 HD-FDD for 10 MHz cell BW<br>R.17 HD-FDD for 5 MHz cell BW: | | R.9 HD-FDD for 10 MHz cell BW:<br>R.17 HD-FDD for 5 MHz cell BW: | |
| OCNG Patterns | | OP.21 FDD for 10 MHz cell BW<br>OP.22 FDD for 5 MHz cell BW | | OP.6 FDD for 10 MHz cell BW:<br>OP.19 FDD for 5 MHz cell BW | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| | dBm/4.5 MHz | -72.96 | -72.96 | -Infinity | -72.96 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.3.19.1-3: DRX-Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |

| | | | |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | Disable | disable | |

**Table A.8.3.19.1-4: *TimeAlignmentTimer* -Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.3.19.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 641.6 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1024 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.4 E-UTRAN TDD - TDD Inter-frequency Measurements

### A.8.4.1 E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells

#### A.8.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2.

The test parameters are given in Table A.8.4.1.1-1 and A.8.4.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.4.1.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |

| | | | |
|---|---|---|---|
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 µs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.4.1.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.8.4.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.8.4.2 E-UTRAN TDD-TDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in synchronous cells

#### A.8.4.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These test will partly verify the TDD-TDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.

The common test parameters are given in Tables A.8.4.2.1-1 and A.8.4.2.1-2. DRX configuration for Test1 and Test2 are given in Table A.8.4.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.4.2.1-4. In these tests, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time aligmend. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The tests consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.4.2.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | | As specified in clause A.3.1.1.2. Note that UE may only be allocated at *On Duration* |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2. |
| E-UTRA RF Channel Number | | 1, 2 | | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Active cell | | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration | | 1 | | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -6 | | |
| Hysteresis | dB | 0 | | |
| CP length | | Normal | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-3 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |

| | | | | |
|---|---|---|---|---|
| DRX | | ON | | DRX related parameters are defined in Table A.8.4.2.1-3 |
| Time offset between cells | | 3 μs | | Synchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.4.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.2.1-3: drx-Configuration to be used in E-UTRAN TDD-TDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.4.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN TDD-TDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and 10.1 in TS 36.213. |

### A.8.4.2.2 Test Requirements

In Test1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 20*1280ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.4.3 E-UTRAN TDD-TDD inter-frequency event triggered reporting under AWGN propagation conditions in synchronous cells with DRX when L3 filtering is used

### A.8.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX when L3 filtering is used. This test will partly verify the TDD-TDD inter-frequency cell search in DRX requirements in clause 8.1.2.3.2.2 and the UE behaviour with the filterCoefficent defined in TS 36.331 [2].

The test parameters are given in Tables A.8.4.3.1-1, A.8.4.3.1-2, A.8.4.3.1-3 and A.8.4.3.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 and the filter coefficient is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 1 as defined in Table 8.1.2.1-1 is provided.

The uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.4.3.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under AWGN propagation conditions with DRX when L3 filtering is used**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Time offset between cells | µs | 3 | synchronous cells |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cells | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cells | | 6 | As specified in table 4.2.1 in TS 36.211 |
| Neighbour A3-Offset Ofn | dB | -14 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 9 | L3 filtering is used |
| DRX | | ON | DRX related parameters are defined in Table A.8.4.3.1-3 |
| T1 | s | 30 | |
| T2 | s | 9 | |

**Table A.8.4.3.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under AWGN propagation conditions with DRX when L3 filtering is used**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 24 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 24 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -74 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -74 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.3.1-3: DRX-Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting in DRX under AWGN propagation conditions with DRX when L3 filtering is used**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |

| | | |
|---|---|---|
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.4.3.1-4: TimeAlignmentTimer -Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting in DRX under AWGN propagation conditions with DRX when L3 filtering is used**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.4.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.4.4 E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.4.4.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.7.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables A.8.4.4.1-1 and A.8.4.4.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.4.4.1-1: General test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF channel number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |

| | | | |
|---|---|---|---|
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | µs | 3 | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.4.4.1-2: Cell specific test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.4.4.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 42 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 42 ACK/NACK number is caused by two parts. Firstly, at least 30 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requiremenet in Clause 8.1.2.3.7.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 12 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.4.5 E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX

### A.8.4.5.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.7. The requirement is verified in a DRX configuration.

The test scenario comprises of two E-UTRA TDD carriers and one cell on each carrier as given in tables A.8.4.5.1-1, A.8.4.5.1-2, A.8.4.5.1-3 and A.8.4.5.1-4. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

In the test UE needs to be provided at least once every 1280ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE sends scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

**Table A.8.4.5.1-1: General test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF channel number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.4.5.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | µs | 3 | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤30 | UE shall report cell within 25.6s (20 DRX cycles) |
| T3 | s | 5 | |

**Table A.8.4.5.1-2: Cell specific test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.5.1-3: DRX configuration for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|

| | | |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf1280 | |
| shortDRX | disable | |

**Table A.8.4.5.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps with DRX**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | Infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.4.5.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.4.6 E-UTRAN TDD-TDD Inter-frequency event triggered reporting for TDD UL/DL configuration 0

### A.8.4.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2.

The test parameters are given in Table A.8.4.6.1-1 and A.8.4.6.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.4.6.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for TDD UL/DL configuration 0**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 0 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |

| | | | |
|---|---|---|---|
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 µs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.4.6.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for TDD UL/DL configuration 0**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.4.6.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7920 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.4.7 E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for Increased Carrier Monitoring without Reduced Performance Group

### A.8.4.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2.

The test parameters are given in Table A.8.4.1.1-1 and A.8.4.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cells 2, 3 or 4.

**Table A.8.4.7.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight TDD carrier frequencies are used in the UE neighbour cell list. |
| Test equipment configuration | | Cell 1 uses UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 | |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 80 | |

**Table A.8.4.7.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells (Cell # 1 and Cell # 2)**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4,5,6,7,8 such that cell 2 is in the normal performance group | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Measurement bandwidth | $\eta_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27 | | 5MHz: 10-15<br>10MHz: 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD | | - | |
| PDSCH allocation | $\eta_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36 | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 |
| Io Note 4 | dBm/ $BW_{channel}$ | -64.76+10log($N_{RB,c}$/50) | -64.76+10log($N_{RB,c}$/50) | -70.22+10log($N_{RB,c}$/50) | -62.43+10log($N_{RB,c}$/50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to cell 1 | ms | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.7.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells (Cell # 3 and Cell # 4)**

| Parameter | Unit | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | Randomly selected from 2,3,4,5,6,7,8 such that cell 3 is in the normal performance group | | Randomly selected from 2,3,4,5,6,7,8 such that cell 4 is in the normal performance group | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27 | | 5MHz: 10-15<br>10MHz: 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | - | | - | |
| PDSCH allocation | $n_{PRB}$ | - | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | -Infinity | 7 | -Infinity | 7 |
| RSRP Note 4 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -91 | -infinity | -91 |
| Io Note 4 | dBm/ $BW_{channel}$ | -70.22+10log($N_{RB,c}$/50) | -62.43+10log($N_{RB,c}$/50) | -70.22+10log($N_{RB,c}$/50) | -62.43+10log($N_{RB,c}$/50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to cell 1 | ms | 3 | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.4.7.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 61.44s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.4.8 TDD-TDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.4.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell measurement requirements for increased UE carrier monitoring in clause 8.1.2.3.

The test parameters are given in Tables A.8.4.8.1-1, A.8.4.8.1-2 and A.8.4.8.1-3. In this test, there are 4 cells on different carrier frequencies and gap pattern configuration #0 as defined in table A.8.4.8.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Events A3 is used. The test consists of two successive time periods for every repetition, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of neighoubour cells. At the start of each

repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.4.8.1-1: General test parameters for TDD-TDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1,2,3,4,5,6,7,8,9 | Serving cell and 8 TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test equipment configuration | | Cell 1 uses E-UTRA RF cannel number 1<br>Cell 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7,8,9 | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2 are randomly selected to use different frequencies selected from E-UTRA frequencies 2, 3, 4.<br>Cells 3, 4 are randomly selected to use different frequencies selected from E-UTRA frequencies 5, 6, 7, 8, 9. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Scaling factor configurations | | 8 | As specified in TS 36.133 clause 8.1.2.1.1a |
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.4.8.1-2: Cell specific test parameters for TDD-TDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX (Cell #1 and Cell #2)**

| Parameter | Unit | Cell 1 | | Cell 2, Cell 3, Cell 4 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Special subframe configuration Note1 | | 6 | | | |
| Uplink-downlink configuration Note1 | | 1 | | | |
| PDSCH parameters: DL Reference Measurement Channel As specified in clause A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz:R.0 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel As specified in clause A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz:R.6 TDD | | 5MHz: R.11 TDD<br>10MHz:R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1, A.3.2.2.2 ,A.3.2.2.9 and A.3.2.2.10 | | 5MHz: OP.9 TDD<br>10MHz:OP.1 TDD | | 5MHz: OP.10.TDD<br>10MHz:OP.2 TDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PHICH_RA | dB | 0 | | 0 | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 2 | dB | | | | |
| OCNG_RB Note 2 | dB | | | | |
| $N_{oc}$ Note 4 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 5 | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 5 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 5 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| Io Note 4 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | |
| Timing offset to Cell 1 | | - | | 3 µs | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 5: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.8.1-3: Cell specific test parameters for TDD-TDD Interfrequency correct reporting of measurement events with reduced performance group configured, non DRX (Cell #3, Cell #4)**

| Parameter | Unit | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | Randomly selected from 5,6,7,8,9 such that cell 3 is in the reduced performance group | | Randomly selected from 5,6,7,8,9 such that cell 4 is in the reduced performance group. Cell 4 RF channel is different from Cell 3 RF channel. | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | | 5MHz: $N_{RB,}$= 25<br>10MHz: $N_{RB,}$= 50 | |
| Special subframe configuration Note1 | | 6 | | | |
| Uplink-downlink configuration Note1 | | 1 | | | |
| PDSCH parameters: DL Reference Measurement Channel As specified in clause A.3.1.1.2 | | - | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel As specified in clause A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz:R.6 TDD | | 5MHz: R.11 TDD<br>10MHz:R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.2 and A.3.2.2.10 | | 5MHz: OP.10.TDD<br>10MHz:OP.2 TDD | | 5MHz: OP.10.TDD<br>10MHz:OP.2 TDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH_RB | dB | 0 | | 0 | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 2 | dB | | | | |
| OCNG_RB Note 2 | dB | | | | |
| $N_{oc}$ Note 4 | dBm/15 kHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -Infinity | 7 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 5 | dB | -Infinity | 7 | -Infinity | 7 |
| RSRP Note 5 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| SCH_RP Note 5 | dBm/15 kHz | -Infinity | -91 | -Infinity | -91 |
| Io Note 5 | dBm/Ch BW | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | |
| Timing offset to Cell 1 | | 3 μs | | 3 μs | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 5: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.4.8.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 13.17s (cell 2) and 153.6s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

## A.8.4.9 TDD-TDD Inter-frequency correct reporting of measurement events with reduced performance group configured, DRX

### A.8.4.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event in DRX. This test will partly verify the TDD-TDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.

The test parameters are given in Tables A.8.4.9.1-1, A.8.4.9.1-2, A.8.4.9.1-3 and A.8.4.9.1-4. In this test, there are four cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

The UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle..

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods for every repetition, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2, 3 or 4. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells

on different frequencies which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.4.9.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for IncMon**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1, 2,3,4,5,6,7,8,9 | Serving cell and eight TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6,7,8 and 9 are indicated to have reduced performance |
| Test equipment configuration | | Cell 1,2,3,4 | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2 are randomly selected to use different frequencies selected from E-UTRA frequencies 2, 3, 4.<br>Cells 3, 4 are randomly selected to use different frequencies selected from E-UTRA frequencies 5, 6, 7, 8, 9. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cells | | Cell 2,3,4 | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| A3-Offset | dB | -5 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.3.9.1-3 |
| Scaling factor for reduced performance group | | 8 | |
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.4.9.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for IncMon**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | Randomly selected from 5, 6, 7, 8, 9 such that cell 3 is in the reduced performance group | | Randomly selected from 5, 6, 7, 8, 9 such that cell 4 is in the reduced performance group | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5MHz: NRB = 25<br>10MHz: NRB = 50 | | 5MHz: NRB,= 25<br>10MHz: NRB,= 50 | | 5MHz: NRB = 25<br>10MHz: NRB = 50 | | 5MHz: NRB,= 25<br>10MHz: NRB,= 50 | |
| PDSCH parameters as specified in clause A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD | | - | | - | | - | |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD | |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 | -Infinity | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 4 | 4 | -Infinity | 4 | -Infinity | 4 | -Infinity | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 | -Infinity | -94 | -Infinity | -94 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -94 | -Infinity | -94 | -Infinity | -94 |
| Io Note 4 | dBm/Ch BW | -64.76+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) | -70.22+10log ($N_{RB,c}$ /50) | -64.76+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | | 1x2 | | 1x2 | |
| Time offset to cell1 | μs | - | | 3 | | 3 | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: $E_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.4.9.1-3: *drx-Configuration* to be used in E-UTRAN TDD-TDD inter-frequency event triggered reporting when DRX is used for IncMon**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf160 | |
| shortDRX | disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

**Table A.8.4.9.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* Configuration to be used in E-UTRAN TDD-TDD inter-frequency event triggered reporting when DRX is used for IncMon**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213.. |

### A.8.4.9.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 13.2s (cell 2) and 153.6s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

Where:

When DRX cycle is 160ms, the delay requirement of cell identification and measurement period are specified in section 8.1.2.3.1.2 and Non DRX Requirements in clause 8.1.2.3.1.1 are applicable.

The requirement of inter frequency cell identification delay are specified as

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,n} \cdot K_n \quad ms \text{(normal performance) and}$$

$$T_{Identify_Inter} = T_{Basic_Identify_Inter} \cdot \frac{480}{T_{Inter1}} \cdot N_{freq,r} \cdot K_r \quad ms \text{(reduced performance)}$$

$T_{Basic_Identify_inter}$ 480ms, See section 8.1.2.3.1.1

$T_{Inter1}$ 60ms, See section 8.1.2.1

$N_{freq,n}$ and $N_{freq,r}$ 3 and 5 set in this test case.

$K_n$ and $K_r$ 8/7 and 8, See section 8.1.2.1.1a.

This gives 13165.7ms for cells 2 on normal carrier, and 153600ms for cell 3 and cell 4 on reduced carriers for Event A3 triggered measurement reporting delay. The test requirements allow 13.2s and 153.6s.

## A.8.4.10 E-UTRAN TDD-TDD Inter-frequency event triggered reporting with MGL=3ms under fading propagation conditions in synchronous cells

### A.8.4.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event with MGL=3ms when Gap pattern configuration #3 is configured. Time offset between frame boundaries of two cells has to be chosen such that the #0 or #5

subframes of the target cell is 500uS early relative to the 2nd subframe of the measurement gap. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2.

The test parameters are given in Table A.8.4.10.1-1 and A.8.4.10.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used and gap pattern configuration # 3 as defined in Table 8.1.2.1-1 is provided. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.4.10.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 3 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.4.10.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.4.10.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.4.11 E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells with burst gap

### A.8.4.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2, when configured with the burst gap.

The test parameters are given in Table A.8.4.11.1-1 and A.8.4.11.1-2 below, including non-uniform gap pattern configuration #1 in Table 8.1.2.1-2. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.4.11.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting with burst gap in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | nonUniform1 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A4 Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| A4 Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| A4 Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 μs | Synchronous cells |
| T1 | s | 5 | |

| | | | |
|---|---|---|---|
| T2 | s | 15 | |

**Table A.8.4.11.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting with burst gap under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 16 | 16 | -Infinity | 7 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | -Infinity | 7 |
| Propagation Condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.4.11.2 Test Requirement

The UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. During the test, downlink traffic is continuously scheduled. From the start of T1 until the measurement report is received during T2, at least [100]% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.4.12 E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeA

## A.8.4.12.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.13.2.6.3.

The test parameters are given in Table A.8.4.12.1-1 and A.8.4.12.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.4.12.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -6 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |
| *Rmax* | | | 8 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 10 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | |
| T2 | | S | 5 | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |

**Table A.8.4.12.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.17 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.15 TDD | | R.15 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.4.12.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3.2 s from the beginning of time period T2. During the test, downlink traffic is continuously scheduled.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.4.13 E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 with discontinuous MPDCCH monitoring in CEModeB

### A.8.4.13.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.13.3.5.3.

The test parameters are given in Table A.8.4.13.1-1 and A.8.4.13.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

**Table A.8.4.13.1-1: General test parameters**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | |
| Active cell | | | Cell 1 | |
| Neighbour cell | | | Cell 2 | Cell to be identified. |
| CP length | | | Normal | |
| DRX | | | OFF | |
| A3 | Offset | dB | -8 | |
| | Hysteresis | dB | 0 | |
| | Time To Trigger | S | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| Gap pattern ID | | | 0 | |

| | | | |
|---|---|---|---|
| *Rmax* | | 128 | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | 8 | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | scheme01 | As defined in *measGapSharingScheme* in [3] |
| T1 | S | 5 | |
| T2 | S | ≤825 | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |

**Table A.8.4.13.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.19 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 TDD | | R.17 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

## A.8.4.13.2 Test Requirement

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 819.2 s from the beginning of time period T2, which is derived from section 8.13.3.5.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to *pusch-maxNumRepetitionCEmodeB* x $TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH, where *pusch-maxNumRepetitionCEmodeB* [2] is the maximum number of PUSCH repetitions configured

## A.8.4.14 E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeA in DRX

### A.8.4.14.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.13.2.6.3.

The test parameters are given in Table A.8.4.14.1-1, A.8.4.14.1-2, A.8.4.14.1-3 and A.8.4.14.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.4.14.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -6 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme10 | | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | | |
| T2 | | S | 10 | 60 | |
| Special subframe configuration | | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | | 1 | | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |

**Table A.8.4.14.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | R.17 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.15 TDD | | R.15 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | -Infinity | 4 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -Infinity | -64.76 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | µs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.4.14.1-3: DRX-Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.4.14.1-4: TimeAlignmentTimer-Configuration**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

### A.8.4.14.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6.4 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 51.2 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the r

## A.8.4.15 E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells for UE category M1 in CEModeB in DRX

### A.8.4.15.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event with discontinuous MPDCCH monitoring. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.13.3.5.3.

The test parameters are given in Table A.8.4.15.1-1, A.8.4.15.1-2, A.8.4.15.1-3 and A.8.4.15.1-4 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

**Table A.8.4.15.1-1: General test parameters**

| Parameter | | Unit | Value | | Comment |
|---|---|---|---|---|---|
| | | | Test1 | Test2 | |
| E-UTRA RF Channel Number | | | 1, 2 | | |
| Active cell | | | Cell 1 | | |
| Neighbour cell | | | Cell 2 | | Cell to be identified. |
| CP length | | | Normal | | |
| DRX | | | ON | | |
| A3 | Offset | dB | -8 | | |
| | Hysteresis | dB | 0 | | |
| | Time To Trigger | S | 0 | | |
| Filter coefficient | | | 0 | | L3 filtering is not used |
| Gap pattern ID | | | 0 | | |
| *Rmax* | | | 8 | | As defined in *mPDCCH-NumRepetition* in [3] |
| *G* | | | 1 | | As defined in *mPDCCH-startSF-UESS* in [3] |
| *X* | | | scheme01 | | As defined in *measGapSharingScheme* in [3] |
| T1 | | S | 5 | | |
| T2 | | S | ≤650 | ≤1050 | |

| | | | |
|---|---|---|---|
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |

**Table A.8.4.15.1-2: Cell specific test parameters**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.19 TDD | | - | |
| MPDCCH parameters: DL Reference Measurement Channel | | R.17 TDD | | R.17 TDD | |
| OCNG Patterns | | OP.11 TDD | | OP.2 TDD | |
| PBCH_RA | dB | -3 | | -3 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| MPDCCH_RA | dB | | | | |
| MPDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -12 | -12 | -Infinity | -12 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -12 | -12 | -Infinity | -12 |
| RSRP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| SCH_RP Note 3 | dBm/15 KHz | -110 | -110 | -Infinity | -110 |
| Io Note 3 | dBm/9MHz | -69.95 | -69.95 | -Infinity | -69.95 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 2x1 Low | | 2x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.4.15.1-3: DRX-Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf128 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.4.15.1-4: TimeAlignmentTimer-Configuration**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

### A.8.4.15.2 Test Requirement

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 641.6 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1024 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.5 E-UTRAN FDD - UTRAN FDD Measurements

### A.8.5.1 E-UTRAN FDD - UTRAN FDD event triggered reporting under fading propagation conditions

#### A.8.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN FDD- UTRAN FDD cell search requirements in clause 8.1.2.4.1.

The test parameters are given in Tables A.8.5.1.1-1, A.8.5.1.1-2 and A.8.5.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.5.1.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |

| | | | |
|---|---|---|---|
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| T1 | s | 5 | |
| T2 | s | 6 | |

**Table A.8.5.1.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.5.1.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | Case 5 (Note 3) | |

| | |
|---|---|
| Note 1: | The DPCH level is controlled by the power control loop. |
| Note 2: | The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$. |
| Note 3: | Case 5 propagation conditions are defined in Annex A of TS 25.101. |

### A.8.5.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.5.2 E-UTRAN FDD - UTRAN FDD SON ANR cell search reporting under AWGN propagation conditions

### A.8.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of the strongest UTRAN cell for SON automatic neighbour relations. This test will partly verify the E-UTRAN FDD - UTRAN FDD cell search requirements for identification of a new UTRA FDD cell for SON given in clause 8.1.2.4.7.1.

The test parameters are given in Tables A.8.5.2.1-1, A.8.5.2.1-2 and A.8.5.2.1-3 below. In the measurement control information it is indicated to the UE that periodical reporting with the purpose 'reportStrongestCellsForSON' is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. Prior to the start of time period T1, an interRATperiodic measurement reporting configuration with purpose reportStrongestCellsForSON is configured, and linked to a UTRA measurement object corresponding to channel UARFCN 1. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.5.2.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD cell search reporting for SON ANR in AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | None | No explicit neighbour list is provided to the UE |
| T1 | s | >5 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | s | 6 | |

**Table A.8.5.2.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for UTRAN FDD cell search for SON ANR under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |

| $BW_{channel}$ | MHz | 10 | |
|---|---|---|---|
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.5.2.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for UTRAN FDD cell search for SON ANR under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | -3.35 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -15 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.

## A.8.5.2.2 Test Requirements

The UE shall send the first measurement report containing the primary scrambling code of cell 2, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The rate of correct measurement reports observed with this delay during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.5.3 E-UTRAN FDD-UTRAN FDD event triggered reporting when DRX is used under fading propagation conditions

### A.8.5.3.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These tests will partly verify the E-UTRAN FDD-UTRAN FDD cell search requirements when DRX is used in clause 8.1.2.4.1.2.

In these tests, there are two cells, one E-UTRAN cell and one UTRAN cell, and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

The common test parameters are given in Table A.8.5.3.1-1. Cell specific test parameters are given in Table A.8.5.3.1-2 for E-UTRAN and in Table A.8.5.3.1-5 for UTRAN. DRX configuration for Test1 and Test2 are given in Table A.8.5.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.5.2.1-4.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time alignment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.5.3.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD event triggered reporting when DRX is used in fading propagation conditions**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1 Note that UE may only be allocated at *On Duration* |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| UTRA RF Channel Number | | 1 | | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | | |
| b1-Threshold-UTRA | dB | -18 | | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.5.3.1-3 |
| Monitored UTRA FDD cell list size | | 12 | | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| T1 | s | 5 | | |
| T2 | s | 6 | 30 | |

**Table A.8.5.3.1-2: Cell specific test parameters for E-UTRAN FDD (cell #1) event triggered reporting of UTRAN FDD cell when DRX is used under fading propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| Propagation Condition | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.5.3.1-3: drx-Configuration to be used in E-UTRAN FDD-UTRAN FDD event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | Disable | Disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

**Table A.8.5.3.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN FDD-UTRAN FDD event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 Value | Test2 Value | Comment |
|---|---|---|---|
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

**Table A.8.5.3.1-5: Cell specific test parameters for UTRAN FDD (cell # 2) for event triggered reporting of UTRAN FDD cell when DRX is used under fading propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |

| | | | |
|---|---|---|---|
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | Case 5 (Note 3) | |
| Note 1: The DPCH level is controlled by the power control loop.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.<br>Note 3: Case 5 propagation conditions are defined in Annex A of TS 25.101. | | | |

### A.8.5.3.2 Test Requirements

In Test1 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 2400 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE sends the measurement report on PUSCH.

In Test2 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 20*1280ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event B1 measurement report.

## A.8.5.4 E-UTRAN FDD - UTRAN FDD enhanced cell identification under AWGN propagation conditions

### A.8.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct enhanced reporting of UTRAN cells. This test will partly verify the Enhanced UTRA FDD cell identification requirements in clause 8.1.2.4.1.1.1a.

The test parameters are given in Tables A.8.5.4.1-1, A.8.5.4.1-2 and A.8.5.4.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time period T1, gaps are activated and an interRAT measurement reporting configuration is configured, and linked to a UTRA measurement object corresponding to channel UARFCN 1. Prior to time duration T2, the UE shall not have any timing information of cell 2. Cell 2 is powered up at the beginning of the T2

**Table A.8.5.4.1-1: General test parameters for E-UTRAN FDD - UTRAN FDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |

| | | | |
|---|---|---|---|
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.8.5.4.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD - UTRAN FDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.5.4.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD - UTRAN FDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |

| | | | |
|---|---|---|---|
| $\hat{I}_{or}/I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io[Note 3] | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.<br>Note 3: This gives an SCH Ec/Io of -15dB | | | |

### A.8.5.4.2 Test Requirements

The UE shall send the first measurement report containing the primary scrambling code of cell 2, with a measurement reporting delay less than 960 ms from the beginning of time period T2. The rate of correct measurement reports observed with this delay during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH

## A.8.5.5 E- UTRAN FDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps

### A.8.5.5.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of UTRA cell with autonomous gaps in clause 8.1.2.4.17.

The test parameters are given in Tables A.8.5.5.1-1, A.8.5.5.1-2 and A.8.5.5.1-3 below. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event B1. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.5.5.1-1: General test parameters for E-UTRAN FDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| SIB3_REP | Frames | 32 | Applicable for cell 2 SIB3 scheduling |
| SIB3 SEG_COUNT | | 1 | Applicable for cell 2 SIB3 scheduling |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CSG id (of cell 2) | | Set to any non-empty value | |

| | | | |
|---|---|---|---|
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.5.5.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.5.5.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io Note 3 | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: This gives an SCH Ec/Io of -15dB

### A.8.5.5.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within [1965] milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ UTRAN\ FDD}$ + reporting delay

= 50 + [630]+40*32 + 2ms from the start of T3

= [1962] ms, allow [1965] ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.5.6 E-UTRAN FDD - UTRAN FDD event triggered reporting without measurement gaps under AWGN propagation conditions

### A.8.5.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event without measurement gaps. This test will partly verify the E-UTRAN FDD- UTRAN FDD cell search requirements in clause 8.1.2.4.1.

The test parameters are given in Tables A.8.5.6.1-1, A.8.5.6.1-2 and A.8.5.6.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. PDCCH on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.5.6.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD event triggered reporting without measurement gaps under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| T1 | s | 5 | |
| T2 | s | 6 | |

**Table A.8.5.6.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for event triggered reporting of UTRAN FDD cell without measurement gaps under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.10 (OP.10 FDD) | | OP.10 FDD | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |

| | | | |
|---|---|---|---|
| PSS_RA | dB | 0 | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $\hat{E}_s / I_{oc}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | |

**Table A.8.5.6.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for event triggered reporting of UTRAN FDD cell without measurement gaps under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$ | | | |

## A.8.5.6.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall send continuous ACK/NACK throughout the test, and from the start of T2 until Event B1 is reported, at least 85% ACK/NACK shall be detected.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.5.7 E-UTRAN FDD - UTRAN FDD Event Triggered Reporting under Fading Propagation Conditions for 5 MHz Bandwidth

### A.8.5.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN FDD- UTRAN FDD cell search requirements in clause 8.1.2.4.1.

The parameters of this test are the same as defined in Section A.8.5.1.1 except that the values of the parameters in the Table A.8.5.7.1-1 will replace the values of the corresponding parameters in A.8.5.1.1-1, and the values of the parameters in the Table A.8.5.7.1-2 will replace the values of the corresponding parameters in A.8.5.1.1-2.

**Table A.8.5.7.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| NOTE 1: See Table A.8.5.1.1-1 for the other parameters.<br>NOTE 2: This test is according to the principle defined in Section A.3.7.2. | | | |

**Table A.8.5.7.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | |
| OCNG Pattern defined in A.3.2.1.15 | | OP.15 FDD | |
| NOTE: See Table A.8.1.3.1-2 for the other parameters. | | | |

### A.8.5.7.2 Test Requirements

The test requirements defined in Section A.8.5.1 shall apply to this test case.

## A.8.5.8 E-UTRA FDD InterRAT UTRA FDD correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.5.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRA FDD-UTRA FDD inter-RAT cell search requirements in clause 8.1.2.4.1.

The test parameters are given in Tables A.8.5.8.1-1 and A.8.5.8.1-2. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2, 3 or 4. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.5.8.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1 | Serving cell and six UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |

| | | | |
|---|---|---|---|
| UE is configured UTRA RF channel numbers | | 2, 3, 4, 5, 6, 7 | |
| Test equipment configuration | | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group |
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Correlation Matrix and Antenna Configuration | | 1x2 low | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Time offset with respect to cell1 | | 0 | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Scaling factor for reduced performance group | | 16 | |
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.5.8.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

**Table A.8.5.8.1-3: Cell specific test parameters for UTRAN FDD (cell # 2, 3 and 4) for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number | | Cells 2 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | | Cells 3 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | | Cells 4 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | |
| CPICH_Ec/Ior | dB | -10 | | | | | |
| PCCPCH_Ec/Ior | dB | -12 | | | | | |
| SCH_Ec/Ior | dB | -12 | | | | | |
| PICH_Ec/Ior | dB | -15 | | | | | |
| DPCH_Ec/Ior | dB | N/A | | | | | |
| OCNS | | -0.941 | | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | -1.8 | -infinity | -1.8 | -infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | | | | | |
| CPICH_Ec/Io | dB | -infinity | -14 | -infinity | -14 | -infinity | -14 |
| Propagation Conditions | | Case 5 (Note 3) | | | | | |
| Notes TBD | | | | | | | |

### A.8.5.8.2 Test Requirements

The UE shall send Event B1 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 7.68s (cell 2) and 115,2s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

## A.8.6 E-UTRAN TDD - UTRAN FDD Measurements

### A.8.6.1 E-UTRAN TDD - UTRAN FDD event triggered reporting under fading propagation conditions

#### A.8.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN TDD- UTRAN FDD cell search requirements in clause 8.1.2.4.2.

The test parameters are given in Tables A.8.6.1.1-1, A.8.6.1.1-2 and A.8.6.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.6.1.1-1: General test parameters for E-UTRAN TDD-UTRAN FDD event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1. |
| CP length | | Normal | Applicable to cell 1. |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| T1 | s | 5 | |
| T2 | s | 6 | |

**Table A.8.6.1.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.6.1.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | Case 5 (Note 3) | |
| Note 1: The DPCH level is controlled by the power control loop.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.<br>Note 3: Case 5 propagation conditions are defined in Annex A of TS 25.101. | | | |

### A.8.6.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.6.2 E- UTRAN TDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps

### A.8.6.2.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of UTRA cell with autonomous gaps in clause 8.1.2.4.18.

The test parameters are given in Tables A.8.6.2.1-1, A.8.6.2.1-2 and A.8.6.2.1-3 below. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event B1. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.6.2.1-1: General test parameters for E-UTRAN TDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1. |
| CP length | | Normal | Applicable to cell 1. |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| SIB3_REP | Frames | 32 | Applicable for cell 2 SIB3 scheduling. |
| SIB3 SEG_COUNT | | 1 | Applicable for cell 2 SIB3 scheduling. |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CSG id (of cell 2) | | Set to any non-empty value | |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.6.2.1-2: Cell specific test parameters for cell #1 E-UTRAN TDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.6.2.1-3: Cell specific test parameters for cell #2 E-UTRAN TDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -∞ | 0.02 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io[Note 3] | dB | -∞ | -13 |
| Propagation Condition | | AWGN | |
| Note 1: The DPCH level is controlled by the power control loop.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.<br>Note 3: This gives an SCH Ec/Io of -15dB | | | |

### A.8.6.2.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within [1965] milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ UTRAN\ FDD}$ + reporting delay

= 50 + [630]+40*32 + 2ms from the start of T3

= [1962] ms, allow [1965] ms.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.6.3 E-UTRA TDD InterRAT UTRA FDD correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.6.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRA TDD-UTRA FDD inter-RAT cell search requirements in clause 8.1.2.4.2.

The test parameters are given in Tables A.8.6.3.1-1 and A.8.6.3.1-2. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2, 3 or 4. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 8 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.6.3.1-1: General test parameters for E-UTRAN TDD-UTRAN FDD for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1 | Serving cell and seven UTRA FDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6 and 7 are indicated to have reduced performance |
| UE is configured UTRA RF channel numbers | | 2, 3, 4, 5, 6, 7,8 | |

| | | | |
|---|---|---|---|
| Test equipment configuration | | Cell 1 uses E-UTRA RF channel number 1<br>Cells 2,3,4 are randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7,8 | Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group |
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Correlation Matrix and Antenna Configuration | | 1x2 low | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1 |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1 |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Scaling factor for reduced performance group | | 16 | |
| T1 | s | 5 | |
| T2 | s | 155 | |

**Table A.8.6.3.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |

**Table A.8.6.3.1-3: Cell specific test parameters for UTRAN FDD (cell # 2, 3 and 4) for correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number | | Cells 2 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | | Cells 3 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | | Cells 4 is randomly selected to use different frequencies selected from UTRA RF channel numbers 2,3,4,5,6,7 | |
| CPICH_Ec/Ior | dB | -10 | | | | | |
| PCCPCH_Ec/Ior | dB | -12 | | | | | |
| SCH_Ec/Ior | dB | -12 | | | | | |
| PICH_Ec/Ior | dB | -15 | | | | | |
| DPCH_Ec/Ior | dB | N/A | | | | | |
| OCNS | | -0.941 | | | | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | -1.8 | -infinity | -1.8 | -infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | | | | | |
| CPICH_Ec/Io | dB | -infinity | -14 | -infinity | -14 | -infinity | -14 |
| Propagation Conditions | | Case 5 (Note 3) | | | | | |
| Notes TBD | | | | | | | |

## A.8.6.3.2 Test Requirements

The UE shall send Event B1 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 7.68s (cell 2) and 115,2s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

# A.8.7 E-UTRAN TDD – UTRAN TDD Measurements

## A.8.7.1 E-UTRAN TDD to UTRAN TDD cell search under fading propagation conditions

### A.8.7.1.1 Test Purpose and Environment

#### A.8.7.1.1.1 Void

#### A.8.7.1.1.2 1.28 Mcps TDD option

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRA TDD to UTRA TDD cell search requirements in clause 8.1.2.4.3 under fading propagation conditions.

This test scenario comprised of 1 E-UTRA TDD PCell, and 1 UTRA TDD cell to be searched. Test parameters are given in Table A.8.7.1.1.2-1, A.8.7.1.1.2-2, and A.8.7.1.1.2-3. Gap pattern configuration #0 as defined in table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.7.1.1.2-1: General test parameters for E-UTRA TDD to UTRA(1.28 Mcps TDD OPTION) cell search in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | E-UTRA TDD cell |
| Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | normal | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 ms | Asynchronous cells |
| Ofn | dB | 0 | |
| Thresh | dBm | -87 | |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.7.1.1.2-2: Cell specific test parameters for cell search E-UTRA TDD to UTRA TDD test case (cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 9 | 9 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | 9 |
| $N_{oc}$ | dBm/15kHz | -98 | |
| RSRP | dBm/15kHz | -89 | -89 |
| SCH_RP | dBm/15kHz | -89 | -89 |
| Propagation Condition | | ETU70 | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.7.1.1.2-3: Cell specific test parameters for cell search E-UTRA TDD to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number NOTE1 | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior NOTE2 | dB | -3 | -3 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 5 | -inf | 5 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -inf | -78 | n.a. | n.a. |
| Propagation Condition | | Case 3 NOTE3 | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: Case 3 propagation conditions are defined in Annex B of TS 25.102

A.8.7.1.1.3 Void

### A.8.7.1.2 Test Requirements

A.8.7.1.2.1 Void

A.8.7.1.2.2 1.28 Mcps TDD option

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.7.1.2.3 Void

## A.8.7.2 E-UTRAN TDD-UTRAN TDD cell search when DRX is used under fading propagation conditions

### A.8.7.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These tests will partly verify the E-UTRAN TDD to UTRAN TDD inter-RAT cell search requirements when DRX is used in clause 8.1.2.4.3.2 under fading propagation conditions.

The common test parameters are given in Tables A.8.7.2.1-1, A.8.7.2.1-2 and A.8.7.2.1-3. DRX configuration for Test1 and Test2 are given in Table A.8.7.2.1-4 and time alignment timer and scheduling request related parameters in Table A.8.7.2.1-5. In these tests, there are two cells, 1 E-UTRAN TDD PCell and 1 UTRAN TDD cell to be searched, Gap pattern configuration # 0 as defined in table 8.1.2.1-1 is provided.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time aligmend. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.7.2.1-1: General test parameters for E-UTRAN TDD to UTRAN 1.28Mcps TDD cell search when DRX is used in fading propagation conditions**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | | As specified in clause A.3.1.1.2. Note that UE may only be allocated at On Duration |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2. |
| Active cell | | Cell 1 | | E-UTRAN TDD cell |
| Neighbour cell | | Cell 2 | | UTRAN 1.28Mcps TDD cell |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration | | 1 | | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| PRACH configuration | | 4 | | As specified in table 5.7.1-3 in TS 36.211 |
| CP length of cell 1 | | Normal | | |
| Ofn | dB | 0 | | |
| Thresh | dBm | -83 | | Absolute P-CCPCH RSCP threshold for event B1 |
| Hysteresis | dB | 0 | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.4.2.1-3 |
| Time offset between cells | | 3 ms | | Asynchronous cells |
| T1 | s | 5 | | |
| T2 | s | 8 | 30 | |

**Table A.8.7.2.1-2: Cell specific test parameters for E-UTRAN TDD to UTRAN 1.28Mcps TDD cell search when DRX is used in fading propagation conditions(cell 1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| BWchannel | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RANote1 | dB | | |
| OCNG_RBNote1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |

| | | | |
|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15kHz | -98 | |
| RSRP Note 3 | dBm/15kHz | -94 | -94 |
| SCH_RP Note 3 | dBm/15kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | |
| Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.8.7.2.1-3: Cell specific test parameters for E-UTRAN TDD to UTRAN 1.28Mcps TDD cell search when DRX is used in fading propagation conditions(cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number NOTE1 | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior NOTE2 | dB | -3 | -3 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 9 | -inf | 9 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -inf | -74 | n.a. | n.a. |
| Propagation Condition | | Case 3 NOTE3 | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | | | | |
| Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to Ior. | | | | | |
| Note 3: Case 3 propagation conditions are defined in Annex B of TS 25.102 | | | | | |

**Table A.8.7.2.1-4: drx-Configuration to be used in E-UTRAN TDD to UTRAN 1.28Mcps TDD cell search when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.7.2.1-5: TimeAlignmentTimer and sr-ConfigIndex -Configuration to be used in E-UTRAN TDD to UTRAN 1.28Mcps TDD cell search when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and 10.1 in TS 36.213. |

### A.8.7.2.2 Test Requirements

In Test1 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 6400ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 25.6s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event B1 measurement report

## A.8.7.3 E-UTRAN TDD - UTRAN TDD SON ANR cell search reporting in AWGN propagation conditions

### A.8.7.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of the strongest UTRAN TDD cell for SON automatic neighbour relations. This test will partly verify the E-UTRAN TDD - UTRAN TDD cell search requirements for identification of a new UTRA TDD cell for SON given in clause 8.1.2.4.13.

In the measurement control information it is indicated to the UE that periodical reporting with the purpose 'reportStrongestCellsForSON' is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. Prior to the start of time period T1, an interRATperiodic measurement reporting configuration with purpose reportStrongestCellsForSON is configured, and linked to a UTRA measurement object corresponding to channel UARFCN 1. During time duration T1, the UE shall not have any timing information of cell 2.

### A.8.7.3.2 Test Parameters

The test parameters are given in Tables A.8.7.3.1-1, A.8.7.3.1-2 and A.8.7.3.1-3.

**Table A.8.7.3.1-1: General test parameters for E-UTRAN TDD-UTRAN TDD cell search reporting for SON ANR in AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| Inter-RAT (UTRA TDD) measurement quantity | | P-CCPCH RSCP | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | None | No explicit neighbour list is provided to the UE |

| | | | |
|---|---|---|---|
| T1 | s | >5 | During T1, cell 2 shall be powered off, and during the off time the primary scrambling code shall be changed, The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2. |
| T2 | s | 14 | |

**Table A.8.7.3.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for UTRAN TDD cell search for SON ANR under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.7.3.1-3: Cell specific test parameters for UTRAN TDD (cell # 2) for UTRAN TDD cell search for SON ANR under AWGN propagation conditions**

| Parameter | Unit | Cell 2 | | | |
|---|---|---|---|---|---|
| | | T1 | | T2 | |
| UTRA RF Channel number Note2 | | Channel 2 | | | |
| DL timeslot number | | 0 | DwPTS | 0 | DwPTS |
| PCCPCH_Ec/Ior | dB | -3 | | -3 | |
| DwPCH_Ec/Ior | dB | | 0 | | 0 |
| OCNS_Ec/Ior | dB | -3 | | -3 | |
| Îor/Ioc | dB | -Infinity | | 5 | |
| PCCPCH RSCP Note1 | dBm | -Infinity | n.a. | -73 | n.a. |
| Io Note1 | dBm/1.28MHz | -Infinity | | -70.88 | |
| Ioc | dBm/1.28MHz | -75 | | | |
| Propagation condition | | AWGN | | | |

Note 1: PCCPCH RSCP and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves.
Note 2: In the case of multi-frequency network of 1.28 Mcps TDD, the UTRA RF Channel Number can be set for the primary frequency in this test.

### A.8.7.3.3 Test Requirements

The UE shall send the first measurement report containing the physical cell identity of cell 2, with a measurement reporting delay less than 12800 ms from the beginning of time period T2.

The rate of correct measurement reports observed with this delay during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.7.4 E-UTRAN TDD - UTRAN TDD enhanced cell identification under AWGN propagation conditions

### A.8.7.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct enhanced reporting of UTRAN TDD cells. This test will partly verify the Enhanced UTRA TDD cell identification requirements in clause 8.1.2.4.3.1.1a under AWGN propagation conditions.

The test parameters are given in Tables A.8.7.4.1-1, A.8.7.4.1-2 and A.8.7.4.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods of T1 and T2 respectively. During time period T1, measurement gaps are activated and an inter-RAT measurement reporting configuration is configured with linkage to a UTRA measurement object corresponding to UARFCN channel number 1. Prior to time duration T2, the UE shall not have any timing information of cell 2. Cell 2 is powered up at the beginning of T2.

**Table A.8.7.4.1-1: General test parameters for E-UTRAN TDD - UTRAN TDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in section A.3.1.2.2. |
| Gap Pattern Id | | 0 | As specified in 3GPP TS 36.133 section 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CP length | | Normal | Applicable to cell 1 |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| Inter-RAT (UTRA TDD) measurement quantity | | P-CCPCH RSCP | |
| Thresh | dBm | -83 | Absolute P-CCPCH RSCP threshold for event B1 |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.8.7.4.1-2: Cell specific test parameters for cell 1 in E-UTRAN TDD - UTRAN TDD enhanced cell identification test under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |

| $BW_{channel}$ | MHz | 10 | |
|---|---|---|---|
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.7.4.1-3: Cell specific test parameters for cell 2 in E-UTRAN TDD - UTRAN TDD enhanced cell identification test under AWGN propagation conditions**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number Note1 | | Channel 1 | | | |
| P-CCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior Note2 | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| P-CCPCH RSCP Note3 | dBm | -inf | -76.77 | n.a. | n.a. |
| P-CCPCH_Ec/Io Note3 | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io Note3 | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.7.4.2 Test Requirements

The UE shall send the first measurement report containing the primary scrambling code of cell 2, with a measurement reporting delay less than 1120 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct measurement reports observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH

## A.8.7.5 E-UTRA TDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.7.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN TDD- UTRAN TDD measurement requirements for increased UE carrier monitoring in clause 8.1.2.4.3.

The test parameters are given in Tables A.8.7.5.1-1, A.8.7.5.1-2 and A.8.7.5.1-3. In this test, there are 4 cells on different carrier frequencies and gap pattern configuration #0 as defined in table A.8.7.5.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Events B1 is used. The test consists of two successive time periods for every reptitaion, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of neighoubour cells. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 7 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.7.5.1-1: General test parameters for E-UTRA TDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1 | Serving cell |
| UE is configured UTRA RF channel numbers | | 2, 3, 4, 5, 6, 7, 8 | 7 UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6, 7,and 8 are indicated to have reduced performance |
| Test equipment configuration | | **Cell 1 uses E-UTRA RF cannel number 1**<br>Cell 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7, 8 | |
| Active cell | | Cell 1 | E-UTRA TDD cell |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| CP length of cell 1 | | normal | |
| Inter-RAT measurement quantity | | UTRA TDD PCCPCH RSCP | |
| B1 Threshold | dBm | -75 | UTRA TDD PCCPCH RSCP threshold for event B1 |
| Hysteresis | dB | 0 | |
| Ofn | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Scaling factor configurations | | 8 | |
| T1 | s | 5 | |
| T2 | s | 205 | |

**Table A.8.7.5.1-2: Cell specific test parameters for E-UTRA TDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX (cell #1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | |
| Uplink-downlink configuration of cell 1 as specified in table 4.2.2 in TS 36.211 | | 1 | |

| | | | |
|---|---|---|---|
| Special subframe configuration of cell 1 as specified in table 4.2.1 in TS 36.211 | | 6 | |
| PDSCH parameters: DL Reference Measurement Channel as specified in clause A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel as specified in clause A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz:R.6 TDD | |
| OCNG Pattern defined in A.3.2.2.1 and A.3.2.2.9 | | 5MHz: OP.9 TDD<br>10MHz:OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 |
| Io Note 3 | dBm/Ch BW | -64.70<br>+10log<br>($N_{RB,c}$ /50) | -64.70<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.<br>Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | |

**Table A.8.7.5.1-3: Cell specific test parameters for E-UTRA TDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX (cell #2, cell #3 and cell #4)**

| Parameter | Unit | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | | T2 | | T1 | | T2 | | T1 | | T2 | |
| Timeslot Number | | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS |
| UTRA RF Channel Number (NOTE1) | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | | Randomly selected from 5,6,7,8 such that cell 3 is in the reduced performance group | | | | Randomly selected from 5,6,7,8 such that cell 4 is in the reduced performance group. Cell 4 RF channel is different from Cell 3 RF channel. | | | |
| PCCPCH_Ec/Ior | dB | -Infinity | | -3 | | -Infinity | | -3 | | -Infinity | | -3 | |
| DwPCH_Ec/Ior | dB | -Infinity | | | 0 | -Infinity | | | 0 | -Infinity | | | 0 |
| OCNS_Ec/Ior | | -Infinity | | -3 | | -Infinity | | -3 | | -Infinity | | -3 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | | 9 | | -Infinity | | 9 | | -Infinity | | 9 | |
| $I_{oc}$ | dBm/1.28 MHz | -70 | | | | -70 | | | | -70 | | | |
| PCCPCH_RSCP Note 3 | dB | -Infinity | | -64 | | -Infinity | | -64 | | -Infinity | | -64 | |
| Io Note 3 | dBm/1.28 MHz | -70.00 | | -60.49 | | -70.00 | | -60.49 | | -70.00 | | -60.49 | |

| | | | | |
|---|---|---|---|---|
| Propagation Condition | | Case 3 (NOTE2) | Case 3 (NOTE2) | Case 3 (NOTE2) |

NOTE1: The DPCH of the cell is located in a timeslot other than 0.
NOTE2: Case 3 propagation conditions are specified in TS25.102 Annex B
NOTE3: PCCPCH_RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves

### A.8.7.5.2 Test Requirements

The UE shall send Event B1 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 21.95s (cell 2) and 204.8s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

# A.8.7A E-UTRAN FDD – UTRAN TDD Measurements

## A.8.7A.1 E-UTRA FDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX

### A.8.7A.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN FDD- UTRAN TDD measurement requirements for increased UE carrier monitoring in clause 8.1.2.4.4.

The test parameters are given in Tables A.8.7A.1.1-1, A.8.7A.1.1-2 and A.8.7A.1.1-3. In this test, there are 4 cells on different carrier frequencies and gap pattern configuration #0 as defined in table A.8.7A.1.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Events B1 is used. The test consists of two successive time periods for every repetition, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of neighbour cells. At the start of each repetition of T1, the test equipment provides signals for cell 1 (serving cell), and cells 2, 3 and 4 which are selected from the 7 cells which are configured in the UE neighbour cell list. Cells 2, 3 and 4 are chosen randomly, such that one frequency belongs to the normal performance group and two frequencies belong to the reduced performance group.

**Table A.8.7A.1.1-1: General test parameters for E-UTRA FDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| UE configured E-UTRA RF Channel Number | | 1 | Serving cell |
| UE is configured UTRA RF channel numbers | | 2, 3, 4, 5, 6, 7, 8 | 7 UTRA TDD carrier frequencies are used in the UE neighbour cell list. Frequencies 5,6, 7,and 8 are indicated to have reduced performance |
| Test equipment configuration | | Cell 1 uses E-UTRA RF cannel number 1<br>Cell 2,3,4 are randomly selected to use different frequencies selected from frequencies 2,3,4,5,6,7, 8 | |
| Active cell | | Cell 1 | E-UTRA FDD cell |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| CP length of cell 1 | | normal | |
| Inter-RAT measurement quantity | | UTRA TDD PCCPCH RSCP | |
| B1 Threshold | dBm | -75 | UTRA TDD PCCPCH RSCP threshold for event B1 |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |

| | | | |
|---|---|---|---|
| DRX | | OFF | |
| Scaling factor configurations | | 8 | |
| T1 | s | 5 | |
| T2 | s | 205 | |

**Table A.8.7A.1.1-2: Cell specific test parameters for E-UTRA FDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX (cell #1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | | 5MHz: $N_{RB}$ = 25<br>10MHz: $N_{RB}$ = 50 | |
| PDSCH parameters: DL Reference Measurement Channel as specified in clause A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel as specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD | |
| OCNG Pattern defined in A.3.2.1.1 and A.3.2.1.15 | | 5MHz: OP.15 FDD<br>10MHz:OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.7A.1.1-3: Cell specific test parameters for E-UTRA FDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured, non DRX (cell #2, cell #3 and cell #4)**

| Parameter | Unit | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | | T2 | | T1 | | T2 | | T1 | | T2 | |
| Timeslot Number | | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS | 0 | DwPTS |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| UTRA RF Channel Number (NOTE1) | | Randomly selected from 2,3,4 such that cell 2 is in the normal performance group | | | Randomly selected from 5,6,7,8 such that cell 3 is in the reduced performance group | | | Randomly selected from 5,6,7,8 such that cell 4 is in the reduced performance group. Cell 4 RF channel is different from Cell 3 RF channel. | | |
| PCCPCH_Ec/Ior | dB | -Infinity | -3 | | -Infinity | -3 | | -Infinity | -3 | |
| DwPCH_Ec/Ior | dB | -Infinity | | 0 | -Infinity | | 0 | -Infinity | | 0 |
| OCNS_Ec/Ior | | -Infinity | -3 | | -Infinity | -3 | | -Infinity | -3 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | 9 | | -Infinity | 9 | | -Infinity | 9 | |
| $I_{oc}$ | dBm/1.28 MHz | -70 | | | -70 | | | -70 | | |
| PCCPCH_RSCP Note 3 | dB | -Infinity | -64 | | -Infinity | -64 | | -Infinity | -64 | |
| Io Note 3 | dBm/1.28 MHz | -70.00 | -60.49 | | -70.00 | -60.49 | | -70.00 | -60.49 | |
| Propagation Condition | | Case 3 (NOTE2) | | | Case 3 (NOTE2) | | | Case 3 (NOTE2) | | |
| NOTE1: The DPCH of the cell is located in a timeslot other than 0.<br>NOTE2: Case 3 propagation conditions are specified in TS25.102 Annex B<br>NOTE3: PCCPCH_RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves | | | | | | | | | | |

### A.8.7A.1.2 Test Requirements

The UE shall send Event B1 triggered measurement reports for cells 2, 3 and 4, with a measurement reporting delay less than 21.95s (cell 2) and 204.8s (cell 3 and 4) from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report.

## A.8.8 E-UTRAN FDD – GSM Measurements

### A.8.8.1 E-UTRAN FDD – GSM event triggered reporting in AWGN

#### A.8.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when doing inter-RAT (GSM) measurements. This test will partly verify the E-UTRAN FDD - GSM cell search requirements in clause 8.1.2.4.5.

The test parameters are given in Tables A.8.8.1.1-1, A.8.8.1.1-2 and A.8.8.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.8.1.1-1: General test parameters for E-UTRAN FDD-GSM event triggered reporting in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | |
| b1-Threshold-GERAN | dBm | -80 | GSM Carrier RSSI threshold for event B1. |
| Hysteresis | dB | 0 | |

| | | | |
|---|---|---|---|
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 1 | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.8.1.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for event triggered reporting of GSM cell in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | |

**Table A.8.8.1.1-3: Cell specific test parameters for GSM (cell # 2) for event triggered reporting of GSM cell in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

## A.8.8.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report including BSIC of cell # 2, with a measurement reporting delay less than 3120 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE 2: The delay for GSM cell identification with BSIC verified is equal to 3120 ms, which is the sum of the event triggered measurement reporting delay and the initial BSIC identification delay.

The event triggered measurement reporting delay = $2*T_{Measurement\ Period,\ GSM}$ = 2* 480ms =960ms.

Initial BSIC identification delay = 2160 ms.

## A.8.8.2 E-UTRAN FDD-GSM event triggered reporting when DRX is used in AWGN

### A.8.8.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These tests will partly verify the E-UTRAN FDD-GSM cell search requirements when DRX is used in clause 8.1.2.4.5.2.

In these tests, there are two cells, one E-UTRAN cell and one GSM cell, and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

The common test parameters are given in Table A.8.8.2.1-1. Cell specific test parameters are given in Table A.8.8.2.1-2 for E-UTRAN and in Table A.8.8.2.1-5 for GSM. DRX configuration for Test1 and Test2 are given in Table A.8.8.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.8.2.1-4.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time alignment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.8.2.1-1: General test parameters for E-UTRAN FDD-GSM event triggered reporting when DRX is used in AWGN**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | | |
| B1-Threshold-GERAN | dBm | -80 | | GSM Carrier RSSI threshold for event B1. |
| Hysteresis | dB | 0 | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.8.2.1-3 |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 1 | | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | | |
| T2 | s | 5 | 45 | |

**Table A.8.8.2.1-2: Cell specific test parameters for E-UTRAN FDD (cell #1) event triggered reporting of GSM cell when DRX is used in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.8.2.1-3: drx-Configuration to be used in E-UTRAN FDD-GSM event triggered reporting when DRX is used in AWGN**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | Disable | Disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

**Table A.8.8.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN FDD-GSM event triggered reporting when DRX is used in AWGN**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

**Table A.8.8.2.1-5: Cell specific test parameters for GSM (cell # 2) for event triggered reporting of GSM cell when DRX is used in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |

| | | | |
|---|---|---|---|
| GSM BSIC | | N/A | Valid |

### A.8.8.2.2 Test Requirements

In Test1 the UE shall send one Event B1 triggered measurement report including BSIC of cell # 2, with a measurement reporting delay less than 3120 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 42.8 seconds from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event B1 measurement report

## A.8.8.3 E-UTRAN FDD – GSM event triggered reporting in AWGN with enhanced BSIC identification

### A.8.8.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when doing inter-RAT (GSM) measurements with enhanced BSIC identification. This test will partly verify the E-UTRAN FDD - GSM cell search requirements in clause 8.1.2.4.5.1.2a

The test parameters are given in Tables A.8.8.3.1-1, A.8.8.1.1-2 and A.8.8.3.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. Prior time duration T1, the UE shall not have any timing information of cell 2. . During time period T1, gaps are activated and an interRAT measurement reporting configuration is configured, and linked to a GSM measurement object including channel ARFCN 1. Cell 2 is powered up at the beginning of T2.

**Table A.8.8.3.1-1: General test parameters for E-UTRAN FDD-GSM event triggered reporting in AWGN with enhanced BSIC identification**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | |
| b1-Threshold-GERAN | dBm | -80 | GSM Carrier RSSI threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 1 | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | T1 ends at the end of the last TTI where the measurement configuration is given |

| | | | |
|---|---|---|---|
| T2 | s | 3 | |

**Table A.8.8.3.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1) for event triggered reporting of GSM cell in AWGN with enhanced BSIC identification**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.8.3.1-3: Cell specific test parameters for GSM (cell # 2) for event triggered reporting of GSM cell in AWGN with enhanced BSIC identification**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN 1 | |
| RXLEV | dBm | -∞ | -75 |
| GSM BSIC | | N/A | Valid |

## A.8.8.3.2 Test Requirements

The UE shall send one Event B1 triggered measurement report including BSIC of cell # 2, with a measurement reporting delay less than 2280 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE 2: The delay for GSM cell identification with BSIC verified is equal to 2280 ms, which is the sum of the event triggered measurement reporting delay and the enhanced initial BSIC identification delay.

The event triggered measurement reporting delay = $2*T_{Measurement\ Period,\ GSM}$ = 2* 480ms =960ms.

Initial BSIC identification delay = 1320 ms.

# A.8.9 E-UTRAN FDD - UTRAN TDD measurements

## A.8.9.1 E-UTRAN FDD - UTRAN TDD event triggered reporting in fading propagation conditions

### A.8.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. The test will partly verify the E-UTRAN FDD - UTRAN TDD cell search requirements in clause 8.1.2.4.4 in fading environment.

The test parameters are given in Table A.8.9.1.1-1, A.8.9.1.1-2 and A.8.9.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.9.1.1-1: General test parameters for Event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Active cell | | Cell 1 | E-UTRA FDD Cell 1 |
| Neighbour cell | | Cell 2 | UTRA TDD Cell 2 is to be identified. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 section8.1.2.1. Measurement Gap Repetition Period = 80ms |
| Inter-RAT measurement quantity | | UTRA TDD PCCPCH RSCP | |
| Threshold other system | dBm | -75 | UTRA TDD PCCPCH RSCP threshold for event B1. |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | | OFF |
| T1 | s | 5 | |
| T2 | s | 15 | |

**Table A.8.9.1.1-2: Cell specific test parameters for Event triggered reporting of UTRA TDD neighbours in fading propagation conditions (cell1)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 1] | dB | | |
| OCNG_RB[Note 1] | dB | | |
| $N_{oc}$ | dBm/15KHz | -98 | |
| RSRP | dBm | -94 | -94 |

| | | | |
|---|---|---|---|
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| P-SCH_RP | dBm | -94 | |
| S-SCH_RP | dBm | -94 | |
| Propagation Condition | | ETU70 | |
| Note 1: OCNG shall be used such that cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | |

**Table A.8.9.1.1-3: Cell specific test parameters for Event triggered reporting of UTRA TDD neighbours in fading propagation conditions (cell2)**

| Parameter | Unit | Cell 2 | | | |
|---|---|---|---|---|---|
| | | T1 | | T2 | |
| Timeslot Number | | 0 | DwPTS | 0 | DwPTS |
| UTRA RF Channel Number (NOTE1) | | Channel1 | | | |
| PCCPCH_Ec/Ior | dB | -Infinity | | -3 | |
| DwPCH_Ec/Ior | dB | -Infinity | | | 0 |
| OCNS_Ec/Ior | | -Infinity | | -3 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Infinity | | 9 | |
| $I_{oc}$ | dBm/1.28 MHz | -70 | | | |
| PCCPCH_RSCP Note 3 | dB | -Infinity | | -64 | |
| Io Note 3 | dBm/1.28 MHz | -70.00 | | -60.49 | |
| Propagation Condition | | Case 3 (NOTE2) | | | |
| NOTE1: The DPCH of the cell is located in a timeslot other than 0.<br>NOTE2: Case 3 propagation conditions are specified in TS25.102 Annex B<br>NOTE3: PCCPCH_RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves | | | | | |

### A.8.9.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 12800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2 x $TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.9.2 E-UTRAN FDD - UTRAN TDD enhanced cell identification under AWGN propagation conditions

### A.8.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct enhanced reporting of UTRAN cells. This test will partly verify the enhanced UTRA TDD cell identification requirements in clause 8.1.2.4.4 under AWGN propagation conditions.

This test scenario comprised of 1 E-UTRA FDD serving cell, and 1 UTRA TDD cell to be searched. Test parameters are given in Table A.8.9.2.1-1, A.8.9.2.1-2, and A.8.9.2.1-3. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time period T1, gaps are activated and an interRAT measurement reporting configuration is configured, and linked to a UTRA measurement object corresponding to channel UARFCN 1. Prior to time duration T2, the UE shall not have any timing information of cell 2. Cell 2 is powered up at the beginning of the T2.

**Table A.8.9.2.1-1: General test parameters for E-UTRAN FDD- UTRAN TDD enhanced cell search in AWGN propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA TDD carrier frequency is used. |
| Inter-RAT (UTRA TDD) measurement quantity | | P-CCPCH RSCP | |
| Thresh | dBm | -83 | Absolute P-CCPCH RSCP threshold for event B1 |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA TDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list |
| Time offset between cells | ms | 3 | |
| T1 | s | 5 | |
| T2 | s | 2 | |

**Table A.8.9.2.1-2: Cell specific test parameters for cell #1 E-UTRAN FDD - UTRAN TDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.9.2.1-3: Cell specific test parameters for cell #2 E-UTRAN FDD - UTRAN TDD enhanced cell identification under AWGN propagation conditions**

| Parameter | Unit | Cell 2 (UTRA TDD) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number[Note1] | | Channel 1 | | | |
| P-CCPCH_Ec/Ior | dB | -4.77 | -4.77 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior[Note2] | dB | -1.76 | -1.76 | | |
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 8 | -inf | 8 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| P-CCPCH RSCP [Note3] | dBm | -inf | -76.77 | n.a. | n.a. |
| P-CCPCH_Ec/Io [Note3] | dB | -inf | -5.41 | n.a. | n.a. |
| DwPCH_Ec/Io [Note3] | dB | n.a. | n.a. | -inf | -0.64 |
| Propagation Condition | | AWGN | | | |

Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.

Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.

Note 3: P-CCPCH RSRP, PCCPCH_Ec/Io and DwPCH_Ec/Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.9.2.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 1120 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.10 E-UTRAN TDD – GSM Measurements

## A.8.10.1 E-UTRAN TDD – GSM event triggered reporting in AWGN

### A.8.10.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when doing inter-RAT (GSM) measurements. This test will partly verify the E-UTRAN TDD - GSM cell search requirements in clause 8.1.2.4.6.

The test parameters are given in Tables A.8.10.1.1-1, A.8.8.1.1-2 and A.8.10.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.10.1.1-1: General test parameters for E-UTRAN TDD-GSM event triggered reporting in AWGN**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |

| | | | |
|---|---|---|---|
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | |
| b1-Threshold-GERAN | dBm | -80 | GSM Carrier RSSI threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 1 | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.10.1.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for event triggered reporting of GSM cell in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.10.1.1-3: Cell specific test parameters for GSM (cell # 2) for event triggered reporting of GSM cell in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |
| Propagation Condition | | AWGN | |

### A.8.10.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report including the valid BSIC of cell # 2, with a measurement reporting delay less than 3120 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE 2: The delay for GSM cell identification with BSIC verified is equal to 3120 ms, which is the sum of the event triggered measurement reporting delay and the initial BSIC identification delay.

The event triggered measurement reporting delay = $2*T_{Measurement\ Period,\ GSM}$ = 2* 480ms =960ms.

Initial BSIC identification delay = 2160 ms.

## A.8.10.2 E-UTRAN TDD-GSM event triggered reporting when DRX is used in AWGN

### A.8.10.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These tests will partly verify the E-UTRAN TDD-GSM cell search requirements when DRX is used in clause 8.1.2.4.6.

In these tests, there are two cells, one E-UTRAN cell and one GSM cell, and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

The common test parameters are given in Table A.8.10.2.1-1. Cell specific test parameters are given in Table A.8.10.2.1-2 for E-UTRAN and in Table A.8.10.2.1-5 for GSM. DRX configuration for Test1 and Test2 are given in Table A.8.10.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.10.2.1-4.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time alignment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.10.2.1-1: General test parameters for E-UTRAN TDD-GSM event triggered reporting when DRX is used in AWGN**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | | As specified in clause A.3.1.1.2. Note that UE may only be allocated at *On Duration* |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2. |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | | Cell 2 is on Absolute RF Channel Number 1 (GSM cell) |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | | 1 | | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | | |
| B1-Threshold-GERAN | dBm | -80 | | GSM Carrier RSSI threshold for event B1. |

| | | | | |
|---|---|---|---|---|
| Hysteresis | dB | 0 | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.10.2.1-3 |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 1 | | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | | |
| T2 | s | 5 | 45 | |

**Table A.8.10.2.1-2: Cell specific test parameters for E-UTRAN TDD (cell #1) event triggered reporting of GSM cell when DRX is used in AWGN**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.10.2.1-3: drx-Configuration to be used in E-UTRAN TDD-GSM event triggered reporting when DRX is used in AWGN**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | Disable | Disable | |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

**Table A.8.10.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN TDD-GSM event triggered reporting when DRX is used in AWGN**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and clause 10.1 in TS 36.213. |

**Table A.8.10.2.1-5: Cell specific test parameters for GSM (cell # 2) for event triggered reporting of GSM cell when DRX is used in AWGN**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFNC 1 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

### A.8.10.2.2 Test Requirements

In Test1 the UE shall send one Event B1 triggered measurement report including BSIC of cell # 2, with a measurement reporting delay less than 3120 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 42.8 seconds from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event B1 measurement report

## A.8.11 Monitoring of Multiple Layers

## A.8.11.1 Multiple E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions

### A.8.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of multiple events. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.11.1.1.1-1 and A.8.11.1.1.1-2. In this test, there are three cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2 or cell 3.

**Table A. 8.11.1.1-1: General test parameters for Inter-frequency E-UTRA FDD – E-UTRA FDD and E-UTRA FDD cell search under fading**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2, 3 | Three FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 and cell 3 | Cell 2 is on RF channel number 2 and cell 3 is on RF channel number 3 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between E-UTRAN FDD cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.11.1.1-2: Cell specific test parameters for Inter-frequency E-UTRA FDD – E-UTRA FDD and E-UTRA FDD cell search under fading**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -98 | -98 | -Infinity | -95 | -Infinity | -95 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | -Infinity | 3 | -Infinity | 3 |
| SCH_RP Note 4 | dBm/15 kHz | -98 | -98 | -Infinity | -95 | -Infinity | -95 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | -Infinity | 3 | -Infinity | 3 |
| Propagation Condition | | AWGN | | ETU70 | | ETU70 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.8.11.1.2 Test Requirements

The UE shall send Event A3 triggered measurement reports for both cell 2 and cell 3, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.11.2 E-UTRAN TDD – E-UTRAN TDD and E-UTRAN TDD Inter-frequency event triggered reporting under fading propagation conditions

### A.8.11.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of two events. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.11.2.1-1 and A.8.11.2.1-2. In this test, there are three cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2 and cell 3.

**Table A.8.11.2.1-1: General test parameters for E-UTRAN TDD - E-UTRAN TDD and E-UTRAN TDD Inter-frequency event triggered reporting under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| E-UTRA RF Channel Number | | 1, 2, 3 | Three TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and 3 are on RF channel numbers 2 and 3 respectively |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between cells | | 3 µs | Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.11.2.1-2: Cell specific test parameters for E-UTRAN TDD - E-UTRAN TDD and E-UTRAN TDD Inter-frequency event triggered reporting under fading propagation conditions cells**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and | | 1x2 | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -98 | -98 | -inf | -95 | -inf | -95 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 | -inf | 3 | -inf | 3 |
| SCH_RP Note 4 | dBm/15 kHz | -98 | -98 | -inf | -95 | -inf | -95 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 | -inf | 3 | -inf | 3 |
| Propagation Condition | | AWGN | | ETU70 | | ETU70 | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.11.2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for cell 2 with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall send one Event A3 triggered measurement report for cell 3 with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.11.3 E-UTRAN FDD-FDD Inter-frequency and UTRAN FDD event triggered reporting under fading propagation conditions

## A.8.11.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event when doing inter frequency and UTRAN FDD measurements. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3 and the E-UTRAN FDD- UTRAN FDD cell search requirements in clause 8.1.2.4.1.

The test parameters are given in Tables A.8.11.3.1-1, A.8.11.3.1-2 and A.8.11.3.1-3. In this test, there are two cells on different carrier frequencies and one cell on UTRAN carrier frequency and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 and B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2 and cell 3.

**Table A.8.11.3.1-1: General test parameters for Combined inter-frequency and UTRAN event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cells | | Cell 2, 3 | Cell 2 is on E-UTRA RF channel number 2.<br>Cell 3 is on UTRA RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| E-UTRAN FDD measurement quantity | | RSRP | |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/N0 | |
| A3-Offset | dB | -6 | |
| b2-Threshold-E-UTRA | dB | -86 | RSRP threshold for event B2. |
| b2-Threshold-UTRA | dB | -18 | CPICH Ec/N0 threshold for event B2. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 8 | |

**Table A.8.11.3.1-2: Cell specific test parameters for Combined inter-frequency and UTRAN event triggered reporting in fading propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PSS_RA | dB | 0 | | 0 | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | AWGN | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.11.3.1-3: Cell specific test parameters for UTRAN FDD (cell # 3) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 3 | |
|---|---|---|---|
| | | T1 | T2 |
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | Case 5 (Note 3) | |

Note 1: The DPCH level is controlled by the power control loop.
Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.
Note 3: Case 5 propagation conditions are defined in Annex A of TS 25.101.

## A.8.11.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.11.4 InterRAT E-UTRA TDD to E-UTRA TDD and UTRA TDD cell search test case

## A.8.11.4.1 Test Purpose and Environment

This test is to verify that the UE makes correct reporting of an event when doing inter frequency measurements and UTRA TDD measurements. The test will partly verify the requirements in clause 8.1.2.3.2 combined 8.1.2.4.3 under fading propagation conditions.

This test scenario comprised of 2 E-UTRA TDD cells operating on different frequency, and 1 UTRA TDD cell. Test parameters are given in table A.8.11.4.1-1, A.8.11.4.1-2, and A.8.11.4.1-3. Gap pattern configuration #0 as defined in clause 8.1.2.1 is provided.

The test consists of 2 successive time periods, with time duration T1 and T2. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 and B2 shall be used.

**Table A.8.11.4.1-1: General test parameters for combined E-UTRA TDD inter-frequency and UTRA TDD cells search under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | E-UTRA TDD cell is on RF channel number 1 |
| Neighbour cell | | Cell 2 | E-UTRA TDD cell is on RF channel number 2 |
| | | Cell 3 | 1.28Mcps TDD cell |
| CP length of cell1 and cell2 | | Normal | |
| Uplink-downlink configuration of cell1 and cell2 | | 1 | As specified in Table 4.2-2 in TS 36.211. The same configuration in both cells |
| Special subframe configuration of cell1 and cell2 | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| E-UTRAN TDD measurement quantity | | RSRP | |
| UTRAN TDD measurement quantity | | RSCP | |
| DRX | | OFF | |
| Ofn | dB | 0 | Parameter for A3 and B2 event |
| Ocn | dB | 0 | Parameter for A3 event |
| Hysteresis | dB | 0 | Parameter for A3 and B2 event |
| Ofs | dB | 0 | Parameter for A3 event |
| Ocs | dB | 0 | Parameter for A3 event |
| A3-Offset | dB | -6 | Parameter for A3 event |
| Thresh1 | dBm | -86 | Absolute E-UTRAN RSRP threshold for event B2 |
| Thresh2 | dBm | -84 | Absolute UTRAN RSCP threshold for event B2 |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| Time offset between E-UTRAN TDD cells | μs | 3 | Synchronous cells |
| T1 | s | >5 | During T1, cell 2 and cell 3 shall be powered off. During the off time the physical layer cell identity of cell 2 shall be changed, and the primary scrambling code of cell 3 shall be changed. |
| T2 | s | 15 | |

**Table A.8.11.4.1-2: Cell specific test parameters for combined E-UTRAN TDD inter-frequency and UTRA TDD cell search under fading propagation conditions(cell1 and cell2)**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |

| | | | | | |
|---|---|---|---|---|---|
| BWchannel | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RANote 1 | dB | | | | |
| OCNG_RBNote 1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP | dBm/15 kHz | -94 | -94 | -infinity | -91 |
| Propagation Condition | | AWGN | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.11.4.1-3: Cell specific test parameters for combined E-UTRA TDD inter-frequency and UTRA TDD cell search under fading propagation conditions(cell3)**

| Parameter | Unit | Cell 3 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number* | | Channel 3 | | | |
| PCCPCH_Ec/Ior | dB | -3 | | | |
| DwPCH_Ec/Ior | dB | | | 0 | |
| OCNS_Ec/Ior | dB | -3 | | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -Infinity | 9 | -Infinity | 9 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -Infinity | -74 | n.a. | |
| Propagation Condition | | Case 3 | | | |

Note1: The DPCH of all cells are located in a timeslot other than 0.
Note2: In the case of multi-frequency network, the UTRA RF Channel Number can be set for the primary frequency in this test.
Note3: P-CCPCH RSCP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.11.4.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680ms from the beginning of time period T2.

The UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12.8s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.11.5 Combined E-UTRAN FDD – E-UTRA FDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions

### A.8.11.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of multiple events when doing inter frequency and GSM measurements. This test will partly verify the E-UTRAN FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.1 and simultaneously the E-UTRAN FDD- GSM cell search requirements in clause 8.1.2.4.5.

The test parameters are given in Tables A.8.11.5.1-1, A.8.11.5.1-2 and A.8.11.5.1-3. In this test, there are two cells on different carrier frequencies and one GSM cell. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 and B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2 and cell 3.

**Table A.8.11.5.1-1: General test parameters for combined E-UTRAN FDD – E-UTRA FDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cells | | Cell 2, 3 | Cell 2 is on E-UTRA RF channel number 2.<br>Cell 3 is on Absolute RF Channel Number 3 (GSM cell). |
| CP length | | Normal | Applicable to cell 1 and cell 2 |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| E-UTRAN FDD measurement quantity | | RSRP | |
| Hysteresis | dB | 0 | Parameter for A3 and B2 event |
| A3-Offset | dB | -6 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between E-UTRAN FDD cells | ms | 3 ms | Asynchronous cells |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | |
| b2-Threshold-E-UTRA | dBm | -83 | RSRP threshold for event B2. This is the threshold for E-UTRA in the B2 configuration. E-UTRA PCell RSRP is below this throughout the test to account for measurement accuracy and fading |
| b2-Threshold-GERAN | dBm | -80 | GSM Carrier RSSI threshold for event B2. |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 3 | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.11.5.1-2: Cell specific test parameters for E-UTRAN FDD cells for combined E-UTRAN FDD – E-UTRA FDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.11.5.1-3: Cell specific test parameters for GSM (cell # 3) for combined E-UTRAN FDD – E-UTRA FDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Cell 3 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN3 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

## A.8.11.5.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for cell 2, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall send one Event B2 triggered measurement report including BSIC of cell 3, with a measurement reporting delay less than 7200 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE 2: The delay for GSM cell identification with BSIC verified is equal to 7200 ms, which is the sum of the event triggered measurement reporting delay and the initial BSIC identification delay.

The event triggered measurement reporting delay = $2*T_{Measurement\ Period,\ GSM} = 2* N_{freq}*480ms = 1920ms$.

Initial BSIC identification delay = 5280 ms, when one carrier frequency other than GSM is monitored in the gaps.

## A.8.11.6 Combined E-UTRAN TDD – E-UTRA TDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions

### A.8.11.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of multiple events when doing inter frequency and GSM measurements. This test will partly verify the E-UTRAN TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.2 and simultaneously the E-UTRAN TDD- GSM cell search requirements in clause 8.1.2.4.6.

The test parameters are given in Tables A.8.11.6.1-1, A.8.11.6.1-2 and A.8.11.6.1-3. In this test, there are two cells on different carrier frequencies and one GSM cell. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 and B2 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2 and cell 3.

**Table A.8.11.6.1-1: General test parameters for combined E-UTRAN TDD – E-UTRA TDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Special subframe configuration of cell1 and cell2 | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration of cell1 and cell2 | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cells | | Cell 2, 3 | Cell 2 is on E-UTRA RF channel number 2.<br>Cell 3 is on Absolute RF Channel Number 3 (GSM cell). |
| CP length | | Normal | Applicable to cell 1 and cell 2 |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| E-UTRAN TDD measurement quantity | | RSRP | |
| Hysteresis | dB | 0 | Parameter for A3 and B2 event |
| A3-Offset | dB | -6 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between E-UTRAN TDD cells | µs | 3 | Synchronous cells |
| Inter-RAT (GSM) measurement quantity | | GSM Carrier RSSI | |

| | | | |
|---|---|---|---|
| b2-Threshold-E-UTRA | dBm | -83 | RSRP threshold for event B2. This is the threshold for E-UTRA in the B2 configuration. E-UTRA PCell RSRP is below this throughout the test to account for measurement accuracy and fading |
| b2-Threshold-GERAN | dBm | -80 | GSM Carrier RSSI threshold for event B2. |
| Monitored GSM cell list size | | 6 GSM neighbours including ARFCN 3 | List of GSM cells provided before T2 starts. |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.11.6.1-2: Cell specific test parameters for E-UTRAN TDD cells for combined E-UTRAN TDD – E-UTRA TDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.11.6.1-3: Cell specific test parameters for GSM (cell # 3) for combined E-UTRAN TDD – E-UTRA TDD and GSM cell search. E-UTRA cells in fading; GSM cell in static propagation conditions**

| Parameter | Unit | Cell 3 | |
|---|---|---|---|
| | | T1 | T2 |
| Absolute RF Channel Number | | ARFCN3 | |
| RXLEV | dBm | -Infinity | -75 |
| GSM BSIC | | N/A | Valid |

### A.8.11.6.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for cell 2, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall send one Event B2 triggered measurement report including BSIC of cell 3, with a measurement reporting delay less than 7200 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

NOTE 2: The delay for GSM cell identification with BSIC verified is equal to 7200 ms, which is the sum of the event triggered measurement reporting delay and the initial BSIC identification delay.

The event triggered measurement reporting delay = $2*T_{Measurement\ Period,\ GSM} = 2* N_{freq}*480ms = 1920ms$.

Initial BSIC identification delay = 5280 ms, when one carrier frequency other than GSM is monitored in the gaps.

## A.8.12 RSTD Intra-frequency Measurements

### A.8.12.1 E-UTRAN FDD intra-frequency RSTD measurement reporting delay test case

#### A.8.12.1.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 8.1.2.5.1 in an environment with fading propagation conditions.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.1.1-1, Table A.8.12.1.1-2, Table A.8.12.1.1-3 and Table A.8.12.1.1-4.

**Table A.8.12.1.1-1: General test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |

| | | | |
|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Transmission Bandwidth | RB | 50 | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 171 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 1 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.12.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.1.1-2: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA[Note 1] | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.1.1-3: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.1.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.12.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.5.1.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2560 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=8 and $n$=16 are the parameters specified in Clause 8.1.2.5.1, Table 8.1.2.5.1-1, under Note 1. This gives the total RSTD measurement time of 2560 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

## A.8.12.1.2A Test Requirements for UE Category 1bis

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.5.3.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=16 and $n$=16 are the parameters specified in Clause 8.1.2.5.3, Table 8.1.2.5.3-1, under Note 1. This gives the total RSTD measurement time of 4960 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

The test parameters are as given in Table A.8.12.1.1-1, Table A.8.12.1.1-2, Table A.8.12.1.1-3 and Table A.8.12.1.1-4, with the exceptions given in Table A.8.12.1.2A-1.

**Table A.8.12.1.2A-1: Specific test parameters for UE Category for 1Bis E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |

## A.8.12.2 E-UTRAN TDD intra-frequency RSTD measurement reporting delay test case

### A.8.12.2.1 Test Purpose and Environment

The purpose of the test is to verify that the RSTD measurement meets the requirements specified in Clause 8.1.2.5.2 in an environment with fading propagation conditions.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1 and T2. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.2.1-1, Table A.8.12.2.1-2, Table A.8.12.2.1-3, and Table A.8.12.2.1-4.

**Table A.8.12.2.1-1: General test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Transmission Bandwidth | RB | 50 | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 174 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |

| | | | |
|---|---|---|---|
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 1 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | The same CP length applies for DL and UL |
| DRX | | ON | DRX parameters are further specified in Table A.8.12.2.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.2.1-2: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |

| | | | | |
|---|---|---|---|---|
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.2.1-3: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test and assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.2.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2. |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | disable | |

## A.8.12.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.5.2.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2560 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=8 and $n$=16 are the parameters specified for this test case in Clause 8.1.2.5.2, Table 8.1.2.5.2-1, under Note 1. This gives the total RSTD measurement time of 2560 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

## A.8.12.2.2A Test Requirements for UE Category 1bis

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.5.4.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=16 and $n$=16 are the parameters specified for this test case in Clause 8.1.2.5.4, Table 8.1.2.5.4-1, under Note 1. This gives the total RSTD measurement time of 4960 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

The test parameters are as given in Table A.8.12.2.1-1, Table A.8.12.2.1-2, Table A.8.12.2.1-3 and Table A.8.12.2.1-4, with the exceptions given in Table A.8.12.2.2A-1.

**Table A.8.12.2.2A-1: Specific test parameters for UE Category for 1Bis E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |

## A.8.12.3 E-UTRAN FDD intra-frequency RSTD measurement period test case in CE Mode A

### A.8.12.3.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.1 and 8.16.2.3.1, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.3.1-1, Table A.8.12.3.1-2, Table A.8.12.3.1-3 and Table A.8.12.3.1-4.

**Table A.8.12.3.1-1: General test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 FDD | | As specified in clause A.3.1.3.1 |

| | | | | |
|---|---|---|---|---|
| *mPDCCH-startSF-UESS* | | 10 | | Parameter $G$ in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.3.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.12.3.1-2: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |

| | | | | |
|---|---|---|---|---|
| PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.3.1-3: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |

| | | |
|---|---|---|
| Propagation Condition | | ETU30 |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.3.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.3.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.1.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.1.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters specified in Section 8.13.2.3.1 (for Cat-M1) and in Section 8.16.2.3.1 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.4 E-UTRAN HD-FDD intra-frequency RSTD measurement period test case in CE Mode A

### A.8.12.4.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.3 and 8.16.2.3.3, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.4.1-1, Table A.8.12.4.1-2, Table A.8.12.4.1-3 and Table A.8.12.4.1-4.

**Table A.8.12.4.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.6 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.4.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |

| | | | |
|---|---|---|---|
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.12.4.1-2: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.4.1-3: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.4.1-4: DRX parameters for the test of E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.4.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.3.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.3.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=16 and $n$=16 are the parameters specified in Section 8.13.2.3.3 (for Cat-M1) and in Section 8.16.2.3.3 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.5 E-UTRAN TDD intra-frequency RSTD measurement period test case in CE Mode A

### A.8.12.5.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.2 and 8.16.2.3.2, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.5.1-1, Table A.8.12.5.1-2, Table A.8.12.5.1-3 and Table A.8.12.5.1-4.

**Table A.8.12.5.1-1: General test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |

| | | | | |
|---|---|---|---|---|
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.14 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 304 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.5.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.12.5.1-2: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.5.1-3: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.5.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.12.5.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.2.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.2.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters specified in Section 8.13.2.3.2 (for Cat-M1) and in Section 8.16.2.3.2 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.6 E-UTRAN FDD intra-frequency RSTD measurement period test case in CE Mode B

### A.8.12.6.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CEMode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.1 and 8.16.3.1.1, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.6.1-1, Table A.8.12.6.1-2, Table A.8.12.6.1-3 and Table A.8.12.6.1-4.

**Table A.8.12.6.1-1: General test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.18 FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |

| | | | | |
|---|---|---|---|---|
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.6.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.12.6.1-2: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |

| | | | | |
|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.6.1-3: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.6.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.6.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.1.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.1.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 12800 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil \frac{n}{M} \right\rceil$, where $M$=16 and $n$=16 are the parameters for Test 1 and $M$=40 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections under Note 1. This gives the total RSTD measurement time of 12800 ms (Test 1) and 5120 ms (Test 2) for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.7 E-UTRAN HD-FDD intra-frequency RSTD measurement period test case in CE Mode B

### A.8.12.7.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.3 and 8.16.3.1.3, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the

reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.7.1-1, Table A.8.12.7.1-2, Table A.8.12.7.1-3 and Table A.8.12.7.1-4.

**Table A.8.12.7.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | **Test 1** | **Test 2** | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.8 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.7.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |

| | | | | |
|---|---|---|---|---|
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.12.7.1-2: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.7.1-3: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.7.1-4: DRX parameters for the test of E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.12.7.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.3.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.3.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 12800 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters for Test 1 and $M$=40 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections under Note 1. This gives the total RSTD measurement time of 12800 ms (Test 1) and 5120 ms (Test 2) for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.8 E-UTRAN TDD intra-frequency RSTD measurement period test case in CE Mode B

### A.8.12.8.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.2 and 8.16.3.1.2, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.8.1-1, Table A.8.12.8.1-2, Table A.8.12.8.1-3 and Table A.8.12.8.1-4.

**Table A.8.12.8.1-1: General test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 304 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 6 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.8.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 6.4 | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.12.8.1-2: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |

| | | | | |
|---|---|---|---|---|
| PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.8.1-3: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.8.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.8.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.2.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.2.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 12800 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters for Test 1 and $M$=40 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections under Note 1. This gives the total RSTD measurement time of 12800 ms (Test 1) and 5120 ms (Test 2) for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.9 E-UTRAN FDD intra-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

### A.8.12.9.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.1 and 8.16.2.3.1, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD measurements. The test is applicable for Cat-M1 and Cat-M2 configured with 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd6 as defined in Table 8.1.2.1-3 is provided to the UE. The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.9.1-1, Table A.8.12.9.1-2, Table A.8.12.9.1-3 and Table A.8.12.9.1-4.

**Table A.8.12.9.1-1: General test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter $G$ in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Transmission Bandwidth | RB | 6 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd6 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 150 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{\mathrm{PRS}}$ | | 311 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |

| | | | |
|---|---|---|---|
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.12.9.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 2 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.60 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.9.1-2: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |

| | | | | |
|---|---|---|---|---|
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.9.1-3: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.9.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.9.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.1.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.1.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil \frac{n}{M} \right\rceil$, where $M$=8 and $n$=16 are the parameters specified in Section 8.13.2.3.1 (for Cat-M1) and in Section 8.16.2.3.1 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 2880 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.10 E-UTRAN HD-FDD intra-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

### A.8.12.10.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.3 and 8.16.2.3.3, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD. The test is applicable for Cat-M1 and Cat-M2 configured with 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd6 as defined in Table 8.1.2.1-3 is provided to the UE.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the

reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.10.1-1, Table A.8.12.10.1-2, Table A.8.12.10.1-3 and Table A.8.12.10.1-4.

**Table A.8.12.10.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.6 HD-FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Transmission Bandwidth | RB | 6 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd6 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 150 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{\mathrm{PRS}}$ | | 311 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.12.4.1-3 |

| | | | |
|---|---|---|---|
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 2 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.60 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.10.1-2: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.10.1-3: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.10.1-4: DRX parameters for the test of E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.10.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.3.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.3.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$ =8 and $n$ =16 are the parameters specified in Section 8.13.2.3.3 (for Cat-M1) and in Section 8.16.2.3.3 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 2880 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.11 E-UTRAN TDD intra-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

### A.8.12.11.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.3.2 and 8.16.2.3.2, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD measurements. The test is applicable for Cat-M1 and Cat-M2 configured with 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd12 as defined in Table 8.1.2.1-3 is provided to the UE.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.11.1-1, Table A.8.12.11.1-2, Table A.8.12.11.1-3 and Table A.8.12.11.1-4.

**Table A.8.12.11.1-1: General test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.14 TDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Transmission Bandwidth | RB | 6 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd12 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 143 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{\mathrm{PRS}}$ | | 304 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.12.5.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |

| | | | |
|---|---|---|---|
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 2 | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.60 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.11.1-2: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.11.1-3: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.11.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.11.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.3.2.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.3.2.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$ =8 and $n$ =16 are the parameters specified in Section 8.13.2.3.2 (for Cat-M1) and in Section 8.16.2.3.2 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 2880 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.12 E-UTRAN FDD intra-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

### A.8.12.12.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.1 and 8.16.3.1.1, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD measurements. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd12 and rstd2 as defined in Table 8.1.2.1-3 is provided to the UE in Test 1 and Test 2, respectively. Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.12.1-1, Table A.8.12.12.1-2, Table A.8.12.12.1-3 and Table A.8.12.12.1-4.

**Table A.8.12.12.1-1: General test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |

| | | | | |
|---|---|---|---|---|
| MPDCCH | | DL Reference Measurement Channel R.18 FDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter $G$ in which determines subframe $k0$ in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 6 | 24 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd12 | rstd2 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 150 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.9.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.60 | | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.12.1-2: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.12.1-3: Cell-specific test parameters for E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.12.12.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.12.12.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.1.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.1.

In Test 1, the UE configured with 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$ =8 and $n$ =16 are the parameters specified in Section 8.13.3.3.1 (for Cat-M1) and in Section 8.16.3.1.1 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 2880 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

# A.8.12.13 E-UTRAN HD-FDD intra-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

## A.8.12.13.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.3 and 8.16.3.1.3, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd12 and rstd2 as defined in Table 8.1.2.1-3 is provided to the UE in Test 1 and Test 2, respectively. Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.13.1-1, Table A.8.12.13.1-2, Table A.8.12.13.1-3 and Table A.8.12.13.1-4.

**Table A.8.12.13.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.8 HD-FDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 6 | 24 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd12 | rstd2 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 150 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{PRS}$ | | 311 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |

| | | | | |
|---|---|---|---|---|
| Number of consecutive downlink positioning subframes $N_{\text{PRS}}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.4.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.60 | | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.13.1-2: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.13.1-3: Cell-specific test parameters for E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.13.1-4: DRX parameters for the test of E-UTRAN HD-FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.13.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.3.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.3.

In Test 1, the UE configured with 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 2880 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil \frac{n}{M} \right\rceil$, where $M$ =8 and $n$ =16 are the parameters specified in Section 8.13.3.3.3 (for Cat-M1) and in Section 8.16.3.1.3 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 2880 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.12.14 E-UTRAN TDD intra-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

### A.8.12.14.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.3.2 and 8.16.3.1.2, respectively, in an environment with fading propagation conditions when the UE requires measurement gaps for performing intra-frequency RSTD measurements. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. All cells are on the same RF channel.

The UE requires measurement gaps to perform intra-frequency measurements. Measurement gap pattern configuration rstd15 and rstd10 as defined in Table 8.1.2.1-3 is provided to the UE in Test 1 and Test 2, respectively. Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.12.14.1-1, Table A.8.12.14.1-2, Table A.8.12.14.1-3 and Table A.8.12.14.1-4.

**Table A.8.12.14.1-1: General test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 TDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in which determines subframe *k0* in which MPDCCH starts |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 6 | 24 | PRS are transmitted in the center RBs |
| Gap pattern Id | | rstd15 | rstd10 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 1, Cell 2, and Cell 3 |
| Gap offset | | 143 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{\mathrm{PRS}}$ | | 624 | | This corresponds to periodicity of 640 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 480$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0 and (PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |

| | | | | |
|---|---|---|---|---|
| TDD uplink-downlink configuration | | 2 | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.12.5.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: 3<br>Cell 3: 3<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | Including the reference cell |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.12.14.1-2: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |

| | | | | |
|---|---|---|---|---|
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.12.14.1-3: Cell-specific test parameters for E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -13 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12.21 | -Infinity | -Infinity | -13 | -13.27 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.92 | -67.18 | -69.92 | -67.18 | -69.92 | -67.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -111 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -107 | -104 | -111 | -111 | -114 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -13 | -16 | -16 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.12.14.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.12.14.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.3.2.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.1.2.

In Test 1, the UE configured with 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5760 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5760 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+640\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=8 and $n$=16 are the parameters specified in Section 8.13.3.3.2 (for Cat-M1) and in Section 8.16.3.1.2 (for Cat-M2) under Note 1. This gives the total RSTD measurement time of 5760 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.13 RSTD Inter-frequency Measurements

### A.8.13.1 E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency

#### A.8.13.1.1 Test Purpose and Environment

The purpose of the test is to verify that the FDD-FDD inter-frequency RSTD measurement meets the requirements specified in Clause 8.1.2.6.1, specifically for Note 2 in Table 8.1.2.6.1-1, in an environment with fading propagation conditions.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the Cell 3, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 and Cell 3 transmit PRS only in T2. Cell 2 transmits PRS only in T3. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.1.1-1, Table A.8.13.1.1-2, Table A.8.13.1.1-3 and Table A.8.13.1.1-4.

**Table A.8.13.1.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4]. The reference cell is the PCell on RF channel 1 in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cells on RF channel 2. The cells appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Bandwidth | RB | 50 | PRS bandwidth is as indicated in prs-Bandwidth in the OTDOA assistance data defined in [24]. Here, PRS are transmitted over the system bandwidth |
| Gap pattern Id | | 0 | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 9 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{PRS}$ | | Cell 1: 181,<br>Cell 2, Cell 3: 171 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 1 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.13.1.1-3. |
| prs-SubframeOffset | | 310 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |

| | | | |
|---|---|---|---|
| slotNumberOffset | | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.13.1.1-2: Cell-specific test parameters for E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | -95 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that the active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.1.1-3: Cell-specific test parameters for E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes

**Table A.8.13.1.1-4: DRX parameters for the test of E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.6.1.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell Cell 1 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=16 and $n$=16 are the parameters specified in Clause 8.1.2.6.1, Table 8.1.2.6.1-1, under Note 2. This gives the total RSTD measurement time of 4960 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

## A.8.13.1.2A Test Requirements for UE Category 1bis

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.6.5.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell Cell 1 within 10080 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=32 and $n$=16 are the parameters specified in Clause 8.1.2.6.5, Table 8.1.2.6.5-1, under Note 2. This gives the total RSTD measurement time of 10080 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

The test parameters are as given in Table A.8.13.1.1-1, Table A.8.13.1.1-2, Table A.8.13.1.1-3 and Table A.8.13.1.1-4, with the exceptions given in Table A.8.13.1.2A-1.

**Table A.8.13.1.2A-1: Specific test parameters for UE Category for 1Bis E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '11111111111111110000000000000000'<br>Cell 2: '00000000000000001111111111111111'<br>Cell 3: '11111111111111110000000000000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |

# A.8.13.2 E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency

## A.8.13.2.1 Test Purpose and Environment

The purpose of the test is to verify that the TDD-TDD inter-frequency RSTD measurement meets the requirements specified in Clause 8.1.2.6.3, specifically for Note 2 in Table 8.1.2.6.3-1, in an environment with fading propagation conditions.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on TDD RF channel 1. Cell 2 and Cell 3 are on TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1 and T2. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the Cell 3, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 and Cell 3 transmit PRS only in T2. Cell 2 transmits PRS only in T3. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.2.1-1, Table A.8.13.2.1-2, Table A.8.13.2.1-3, and Table A.8.13.2.1-4.

**Table A.8.13.2.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4]. The reference cell is the PCell on RF channel 1 in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cells on RF channel 2. The cells appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Bandwidth | RB | 50 | PRS bandwidth is as indicated in prs-Bandwidth in the OTDOA assistance data defined in [24]. Here, PRS are transmitted over the system bandwidth |
| Gap pattern Id | | 0 | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 12 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS configuration index $I_{PRS}$ | | Cell 1: 184,<br>Cell 2, Cell 3: 174 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 1 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |

| | | | |
|---|---|---|---|
| TDD uplink-downlink configuration | | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | The same CP length for DL and UL |
| DRX | | ON | DRX parameters are further specified in Table A.8.13.2.1-3. |
| prs-SubframeOffset | | 310 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| *slotNumberOffset* | | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receivetime offset between the cells at the UE antenna connecto | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.13.2.1-2: Cell-specific test parameters for E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA[Note 1] | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | -95 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that the active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.2.1-3: Cell-specific test parameters for E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test and assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.13.2.1-4: DRX parameters for the test of E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2. |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | disable | |

## A.8.13.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.6.3.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell Cell 1 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=16 and $n$=16 are the parameters specified in Clause 8.1.2.6.3, Table 8.1.2.6.3-1, under Note 2. This gives the total RSTD measurement time of 4960 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

## A.8.13.2.2A Test Requirements for UE Category 1bis

The RSTD measurement time fulfils the requirements specified in Clause 8.1.2.6.7.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell Cell 1 within 10080 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil$, where $M$=32 and $n$=16 are the parameters specified in Clause 8.1.2.6.7, Table 8.1.2.6.7-1, under Note 2. This gives the total RSTD measurement time of 10080 ms for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

The test parameters are as given in Table A.8.13.2.1-1, Table A.8.13.2.1-2, Table A.8.13.2.1-3 and Table A.8.13.2.1-4, with the exceptions given in Table A.8.13.2.2A-1.

**Table A.8.13.2.2A-1: Specific test parameters for UE Category for 1Bis E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '11111111111111110000000000000000'<br>Cell 2: '00000000000000001111111111111111'<br>Cell 3: '11111111111111110000000000000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |

## A.8.13.3 E-UTRAN FDD inter-frequency RSTD measurement period test case in CE Mode A

### A.8.13.3.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.1 and 8.16.2.4.1, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.3.1-1, Table A.8.13.3.1-2, Table A.8.13.3.1-3 and Table A.8.13.3.1-4.

**Table A.8.13.3.1-1: General test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 FDD | | As specified in clause A.3.1.3.1 |

| | | | | |
|---|---|---|---|---|
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 10 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | Cell 1: 181,<br>Cell 2, Cell 3: 171 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 4 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T1 |

| | | | | |
|---|---|---|---|---|
| T3 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.3.1-2: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.3.1-3: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.3.1-4: DRX parameters for the test of E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.3.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.1.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.1.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 15360 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=48 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 15360 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

## A.8.13.4 E-UTRAN HD-FDD inter-frequency RSTD measurement period test case in CE Mode A

### A.8.13.4.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.3 and 8.16.2.4.3, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.4.1-1, Table A.8.13.4.1-2, Table A.8.13.4.1-3 and Table A.8.13.4.1-4.

**Table A.8.13.4.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.6 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 10 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{\mathrm{PRS}}$ | | Cell 1: 181,<br>Cell 2, Cell 3: 171 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 4 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.4.1-2: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.4.1-3: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.4.1-4: DRX parameters for the test of E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.4.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.3.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.3.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 15360 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=48 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 15360 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

# A.8.13.5 E-UTRAN TDD inter-frequency RSTD measurement period test case in CE Mode A

## A.8.13.5.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.2 and 8.16.2.4.2, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on TDD RF channel 1. Cell 2 and Cell 3 are on a TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.5.1-1, Table A.8.13.5.1-2, Table A.8.13.5.1-3 and Table A.8.13.5.1-4.

**Table A.8.13.5.1-1: General test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.14 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 13 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |

| | | | | |
|---|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 184,<br>Cell 2, Cell 3: 174 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 4 | 2 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 7.68 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.5.1-2: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.5.1-3: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |

| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.5.1-4: DRX parameters for the test of E-UTRAN TDD intre-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.5.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.2.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.2.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 15360 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=48 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 15360 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

# A.8.13.6 E-UTRAN FDD inter-frequency RSTD measurement period test case in CE Mode B

## A.8.13.6.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CEMode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.1 and 8.16.3.2.1, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.6.1-1, Table A.8.13.6.1-2, Table A.8.13.6.1-3 and Table A.8.13.6.1-4.

**Table A.8.13.6.1-1: General test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 10 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |

| | | | | |
|---|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 181,<br>Cell 2, Cell 3: 171 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.6.1-2: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.6.1-3: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | 0 | N/A | N/A | 0 | 0 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.6.1-4: DRX parameters for the test of E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.6.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.1.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.1.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 40960 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil \frac{n}{M} \right\rceil$,

where $M$=128 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 40960 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

# A.8.13.7 E-UTRAN HD-FDD inter-frequency RSTD measurement period test case in CE Mode B

## A.8.13.7.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.3 and 8.16.3.2.3, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.7.1-1, Table A.8.13.7.1-2, Table A.8.13.7.1-3 and Table A.8.13.7.1-4.

**Table A.8.13.7.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.8 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 10 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |

| | | | | |
|---|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 181,<br>Cell 2, Cell 3: 171 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.7.1-2: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | N/A | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.7.1-3: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.7.1-4: DRX parameters for the test of E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.7.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.3.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.3.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 40960 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=128 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 40960 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

# A.8.13.8 E-UTRAN TDD inter-frequency RSTD measurement period test case in CE Mode B

## A.8.13.8.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.2 and 8.16.3.2.2, respectively, in an environment with fading propagation conditions. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on TDD RF channel 1. Cell 2 and Cell 3 are on a TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.8.1-1, Table A.8.13.8.1-2, Table A.8.13.8.1-3 and Table A.8.13.8.1-4.

**Table A.8.13.8.1-1: General test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Gap pattern Id | | 0 | | As specified in Table 8.1.2.1-1. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 13 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |

| | | | | |
|---|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 184,<br>Cell 2, Cell 3: 174 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 310 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 20.48 | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.8.13.8.1-2: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.8.1-3: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.8.1-4: DRX parameters for the test of E-UTRAN TDD intre-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.8.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.2.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.2.

In Test 1, the UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 40960 ms starting from the beginning of time interval T2.

In Test 2, the shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=128 and $n$=16 are the parameters for Test 1 and $M$=32 and $n$=16 are the parameters for Test 2, specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 40960 ms in Test 1 and 10240 ms in Test 2 for Cell 2 and Cell 3 with respect to the reference cell Cell 1.

# A.8.13.9 E-UTRAN FDD inter-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

## A.8.13.9.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.1 and 8.16.2.4.1, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 configured with 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd6 as defined in Table 8.1.2.1-3 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.9.1-1, Table A.8.13.9.1-2, Table A.8.13.9.1-3 and Table A.8.13.9.1-4.

**Table A.8.13.9.1-1: General test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Gap pattern Id | | rstd6 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 91 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | PRS are transmitted over the system bandwidth |

| | | | |
|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 232,<br>Cell 2, Cell 3: 252 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 20 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.9.1-2: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.9.1-3: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.9.1-4: DRX parameters for the test of E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.9.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.1.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.1.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=16 and $n$=16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

# A.8.13.10 E-UTRAN HD-FDD inter-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

## A.8.13.10.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.3 and 8.16.2.4.3, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd6 as defined in Table 8.1.2.1-3 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.10.1-1, Table A.8.13.10.1-2, Table A.8.13.10.1-3 and Table A.8.13.10.1-4.

**Table A.8.13.10.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.6 HD-FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Gap pattern Id | | rstd6 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 91 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | PRS are transmitted over the system bandwidth |

| | | | |
|---|---|---|---|
| PRS configuration index $I_{PRS}$ | | Cell 1: 232,<br>Cell 2, Cell 3: 252 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 20 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.10.1-2: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.10.1-3: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1 | -Infinity | -Infinity | -7 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.68 | -70.22 | -70.11 | -67.08 | -70.11 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -105 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.10.1-4: DRX parameters for the test of E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.10.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.3.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.3.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$,

where $M$=16 and $n$=16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

# A.8.13.11 E-UTRAN TDD inter-frequency RSTD measurement period test case in CE Mode A with longer PRS occasions

## A.8.13.11.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD measurement meets the requirements specified in Sections 8.13.2.4.2 and 8.16.2.4.2, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 configured with 1.4 MHz UE RF bandwidth and supporting measurement gaps specified in Table 8.1.2.1-3.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd6 as defined in Table 8.1.2.1-3 is provided and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.11.1-1, Table A.8.13.11.1-2, Table A.8.13.11.1-3 and Table A.8.13.11.1-4.

**Table A.8.13.11.1-1: General test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Reference cell | | Cell 1 | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.14 TDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Gap pattern Id | | rstd12 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 91 | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | PRS are transmitted over the system bandwidth |

| | | | |
|---|---|---|---|
| PRS configuration index $I_{\mathrm{PRS}}$ | | Cell 1: 212,<br>Cell 2, Cell 3: 252 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 12 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *additional-prs-config* capability |
| | | 20 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355, for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_{\mathrm{s}}$ and UpPTS of $4384 \cdot T_{\mathrm{s}}$ |
| CP length | | Normal | |
| DRX | | ON | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 40 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | Correponds to prs-MutingInfo defined in TS 36.355 [24] |

| | | | |
|---|---|---|---|
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.11.1-2: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.11.1-3: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |

| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
|---|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -Infinity | -Infinity | -7 | -7 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -1.79 | -Infinity | -Infinity | -7 | -9.54 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.55 | -67.08 | -69.55 | -67.08 | -69.55 | -67.08 |
| PRP Note 4 | dBm/ 15 kHz | -99 | -Infinity | -Infinity | -102 | -105 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -93 | -105 | -105 | -108 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -10 | -10 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.11.1-4: DRX parameters for the test of E-UTRAN TDD intre-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.11.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.13.2.4.2.

For Cat-M2 UE in CE Mode A, the RSTD measurement time fulfils the requirements specified in Clause 8.16.2.4.2.

The UE shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil \frac{n}{M} \right\rceil$, where $M$ =16 and $n$ =16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.13.12 E-UTRAN FDD inter-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

### A.8.13.12.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.1 and 8.16.3.2.1, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd12 and rstd2 as defined in Table 8.1.2.1-3 is provided to the UE in Test 1 and Test 2, respectively, and configured to not overlap with PRS subframes of Cell 1. Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.12.1-1, Table A.8.13.12.1-2, Table A.8.13.12.1-3 and Table A.8.13.12.1-4.

**Table A.8.13.12.1-1: General test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.18 FDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| Gap pattern Id | | rstd12 | rstd2 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 151 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{\text{PRS}}$ | | Cell 1: 232,<br>Cell 2, Cell 3: 312 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\text{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\text{PRS}}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 80 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |

| | | | |
|---|---|---|---|
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.12.1-2: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.12.1-3: Cell-specific test parameters for E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.12.1-4: DRX parameters for the test of E-UTRAN FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.12.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.1.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.2.

In Test 1, the UE configured 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.13.13 E-UTRAN HD-FDD inter-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

### A.8.13.13.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.3 and 8.16.3.2.3, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd12 and rstd2 as defined in Table 8.1.2.1-3 is provided to the UE in Test 1 amd Test 2, respectively, and configured to not overlap with PRS subframes of Cell 1.

The test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of T2, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.13.1-1, Table A.8.13.13.1-2, Table A.8.13.13.1-3 and Table A.8.13.13.1-4.

**Table A.8.13.13.1-1: General test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.8 HD-FDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| Gap pattern Id | | rstd12 | rstd2 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 151 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{\text{PRS}}$ | | Cell 1: 232,<br>Cell 2, Cell 3: 312 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\text{PRS}} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\text{PRS}}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 80 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |

| | | | |
|---|---|---|---|
| T2 | s | 2.56 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 2.56 | The length of the time interval that follows immediately after time interval T2 |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.13.1-2: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.13.1-3: Cell-specific test parameters for E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.21 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.13.1-4: DRX parameters for the test of E-UTRAN HD-FDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.13.13.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.3.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.3.

In Test 1, the UE configured with 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 5120 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+320\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 5120 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

## A.8.13.14 E-UTRAN TDD inter-frequency RSTD measurement period test case in CE Mode B with longer PRS occasions

### A.8.13.14.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD measurement meets the requirements specified in Sections 8.13.3.7.2 and 8.16.3.2.2, respectively, in an environment with fading propagation conditions. The test is applicable for Cat-M1 and Cat-M2 UE supporting measurement gaps specified in Table 8.1.2.1-3. Test 1 is applicable for Cat-M1 and Cat-M2 supporting and configured with 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting and configured with 5 MHz UE RF bandwidth.

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the reference as well as the PCell. Cell 2 and Cell 3 are the neighbour cells. Cell 1 is on FDD RF channel 1. Cell 2 and Cell 3 are on a TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration rstd15 and rstd10 as defined in Table 8.1.2.1-3 is provided to th UE in Test 1 and Test 2, respectively, and configured to not overlap with PRS subframes of Cell 1. Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 and Cell 3 are activated only in the beginning of T2. Cell 2 is active until the end of T3, and Cell 3 is active until the end of T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2. Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355 [24], Clause 6.5.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE at the start of T1. DRX is configured before T2.

The test parameters are as given in Table A.8.13.14.1-1, Table A.8.13.14.1-2, Table A.8.13.14.1-3 and Table A.8.13.14.1-4.

**Table A.8.13.14.1-1: General test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| Reference cell | | Cell 1 | | Reference cell is the cell in the OTDOA assistance data with respect to which the RSTD measurement is defined, as specified in TS 36.214 [4] and TS 36.355 [24]. The reference cell is the PCell in this test case. |
| Neighbor cells | | Cell 2 and Cell 3 | | Cell 2 and Cell 3 appear at random places in the neighbour cell list in the OTDOA assistance data, but Cell 2 always appears in the first half of the list, whilst Cell 3 appears in the second half of the list. |
| MPDCCH | | DL Reference Measurement Channel R.16 TDD | | As specified in clause A.3.1.3 |
| *mPDCCH-startSF-UESS* | | 10 | | Parameter *G* in which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |

| | | | | |
|---|---|---|---|---|
| Gap pattern Id | | rstd15 | rstd10 | As specified in Table 8.1.2.1-3. Applies for measurements on Cell 2 and Cell 3 |
| Gap offset | | 131 | | As specified in TS 36.331 [2], Clause 6.3.5 |
| PRS Transmission Bandwidth | RB | 50 Note 1 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{\mathrm{PRS}}$ | | Cell 1: 532,<br>Cell 2, Cell 3: 612 | | This corresponds to periodicity of 640 ms and PRS subframe offset of $I_{\mathrm{PRS}} - 480$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{\mathrm{PRS}}$ | | 30 | 8 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *additional-prs-config* capability |
| | | 40 | 10 | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion. Corresponds to parameter *add-numDL-Frames* in TS 36.355 [24], for UE with *densePrsConfig* capability |
| Physical cell ID PCI | | (PCI of Cell 1 – PCI of Cell 2)mod6=0<br>and<br>(PCI of Cell 1 – PCI of Cell 3)mod6=0 | | The cell PCIs are selected such that the relative shifts of PRS patterns among cells are as given by the test parameters |
| TDD uplink-downlink configuration | | 2 | 1 | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.13.3.1-3 |
| prs-SubframeOffset | | 80 | | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 1<br>Cell 3 to Cell 1: -1 | | PRS are transmitted from synchronous cells |
| Expected RSTD | µs | Cell 2: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |

| | | | |
|---|---|---|---|
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | The length of the time interval from the beginning of each test |
| T2 | s | 5.12 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 5.12 | The length of the time interval that follows immediately after time interval T2 |
| Note 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.8.13.14.1-2: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T1**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | -67.22 | -67.22 |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.13.14.1-3: Cell-specific test parameters for E-UTRAN TDD inter-frequency RSTD measurement reporting delay under fading propagation conditions during T2 and T3**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x1 | | 1x1 | | 1x1 | |
| OCNG patterns defined in A.3.2.1 | | OP.11 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -3 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -12 | -Infinity | -Infinity | -13 | -14 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -70.17 | -67.13 | -70.19 | -70.18 | -70.19 | -70.18 |
| PRP Note 4 | dBm/ 15 kHz | -110 | -Infinity | -Infinity | -108 | -112 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -110 | -110 | -114 | -108 | -112 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | -9 | -9 | -14 | -13 | -14 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.13.14.1-4: DRX parameters for the test of E-UTRAN TDD intre-frequency RSTD measurement reporting delay under fading propagation conditions**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.13.14.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.13.3.7.2.

For Cat-M2 UE in CE Mode B, the RSTD measurement time fulfils the requirements specified in Clause 8.16.3.2.2.

In Test 1, the UE configured with 1.4 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.

In Test 2, the UE configured with 5 MHz RF bandwidth shall perform and report the RSTD measurements for Cell 2 and Cell 3 with respect to the reference cell in the OTDOA assistance data, Cell 1, within 10240 ms starting from the beginning of time interval T2.The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement time in the test is derived from the following expression, $T_{PRS}(M-1)+640\cdot\left\lceil\frac{n}{M}\right\rceil$, where $M$=16 and $n$=16 are the parameters specified in the corresponding requirements sections, under Note 2. This gives the total RSTD measurement time of 10240 ms for Cell 2 and Cell 3 with respect to the reference Cell 1.

# A.8.14 E-UTRAN TDD - FDD Inter-frequency Measurements

## A.8.14.1 E-UTRAN TDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells

### A.8.14.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.3.

The test parameters are given in Tables A.8.14.1.1-1 and A.8.14.1.1-2. In this test, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.14.1.1-1: General test parameters for E-UTRAN TDD-FDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Cell 1 PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Cell1 Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. |
| Cell1 Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2. |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 1 E-UTRA TDD RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Cell 2 E-UTRA FDD RF Channel Number | | 2 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |

| | | | |
|---|---|---|---|
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.14.1.1-2: Cell specific test parameters for E-UTRAN TDD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 TDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.14.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.14.2 E-UTRAN TDD-FDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells

### A.8.14.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These test will partly verify the TDD-FDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.

The common test parameters are given in Tables A.8.14.2.1-1 and A.8.14.2.1-2. DRX configuration for Test1 and Test2 are given in Table A.8.14.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.14.2.1-4. In these tests, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time aligmend. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.14.2.1-1: General test parameters for E-UTRAN TDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |
| Cell1 PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | | As specified in clause A.3.1.1.2. Note that UE may only be allocated at *On Duration* |
| Cell1PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2. |
| Cell2 PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1. Note that UE may only be allocated at *On Duration* |
| Cell2PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1. |
| E-UTRA RF Channel Number | | 1 | | one TDD carrier frequencies is used. |
| E-UTRA RF Channel Number | | 2 | | one FDD carrier frequencies is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Active cell | | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| Cell1 Uplink-downlink configuration | | 1 | | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| Cell1 Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| A3-Offset | dB | -6 | | |
| Hysteresis | dB | 0 | | |
| CP length | | Normal | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| PRACH configuration | | 4 | | As specified in table 5.7.1-3 in TS 36.211 |
| Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.14.2.1-3 |
| Time offset between cells | | 3 ms | | Asynchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.14.2.1-2: Cell specific test parameters for E-UTRAN TDD-FDD inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 TDD | | OP.2 FDD | |
| PBCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RB | dB | 0 | | 0 | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.14.2.1-3: drx-Configuration to be used in E-UTRAN TDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.14.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN TDD-FDD inter-frequency event triggered reporting when DRX is used in fading propagation conditions**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 2 | 2 | For further information see clause 6.3.2 in TS 36.331 and 10.1 in TS 36.213. |

## A.8.14.2.2 Test Requirements

In Test1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 20*1280ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report

## A.8.14.3 E-UTRAN TDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.14.3.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.6.

The test scenario comprises of one E-UTRA FDD carriers and one cell on each carrier as given in tables A.8.14.3.1-1 and A.8.14.3.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.14.3.1-1: General test parameters for E-UTRAN TDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Cell1PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| Cell1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Cell2 PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell2 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell1 E-UTRA RF channel number | | 1 | One TDD carrier is used |
| Cell2 E-UTRA RF channel number | | 2 | One FDD carrier is used |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Cell1 special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. |
| Cell1 Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. |
| Gap Pattern Id | | 0 | As specified in 3GPP TS 36.133 section 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.14.3.1-2: Cell specific test parameters for E-UTRAN TDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| E-UTRA RF Channel Number | | 1 | | | 2 | | |
|---|---|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 FDD | **OP.2 FDD** | **OP.2 FDD** |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.14.3.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 42 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 42 ACK/NACK number is caused by two parts. Firstly, at least 30 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requiremenet in Clause 8.1.2.3.7.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 12 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

# A.8.15 E-UTRAN FDD - TDD Inter-frequency Measurements

## A.8.15.1 E-UTRAN FDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells

### A.8.15.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.4.

The test parameters are given in Table A.8.15.1.1-1 and A.8.15.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.15.1.1-1: General test parameters for E-UTRAN FDD-TDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Cell 1 PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Cell2 Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to Cell 2. |
| Cell2 Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2. Applicable to Cell 2. |
| CP length | | Normal | |
| Cell 1 E-UTRA FDD RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Cell 2 E-UTRA TDD RF Channel Number | | 2 | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 ms | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.15.1.1-2: Cell specific test parameters for E-UTRAN FDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 FDD | | OP.2 TDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH_RB | dB | 0 | | 0 | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.15.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCC

## A.8.15.2 E-UTRAN FDD-TDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells

### A.8.15.2.1 Test Purpose and Environment

The purpose of these tests is to verify that the UE makes correct reporting of an event in DRX. These tests will partly verify the FDD-TDD inter-frequency cell search requirements when DRX is used in clause 8.1.2.3.4.

The common test parameters are given in Tables A.8.15.2.1-1 and A.8.15.2.1-2. DRX configuration for Test1 and Test2 are given in Table A.8.15.2.1-3 and time alignment timer and scheduling request related parameters in Table A.8.15.2.1-4. In these tests, there are two cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle. In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The tests consist of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.15.2.1-1: General test parameters for E-UTRAN FDD-TDD inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Test 1 | Test 2 | Comment |
|---|---|---|---|---|
| | | Value | | |

| | | | | |
|---|---|---|---|---|
| Cell 1 PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | | As specified in clause A.3.1.1.1 Note that UE may only be allocated at *On Duration* |
| Cell 1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1. |
| Cell 2 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2. |
| Cell 1 E-UTRA FDD RF Channel Number | | 1 | | One FDD carrier frequency is used. |
| Cell 2 E-UTRA TDD RF Channel Number | | 2 | | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| Active cell | | Cell 1 | | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | | |
| Hysteresis | dB | 0 | | |
| CP length | | Normal | | |
| TimeToTrigger | s | 0 | | |
| Filter coefficient | | 0 | | L3 filtering is not used |
| E-UTRA FDD PRACH configuration | | 4 | | As specified in table 5.7.1-2 in TS 36.211 |
| Cell 2 Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211 |
| Cell 2 Uplink-downlink configuration | | 1 | | As specified in table 4.2-2 in TS 36.211 |
| E-UTRA TDD Access Barring Information | - | Not Sent | | No additional delays in random access procedure. |
| DRX | | ON | | DRX related parameters are defined in Table A.8.15.2.1-3 |
| Time offset between cells | ms | 3 | | Asynchronous cells |
| T1 | s | 5 | | |
| T2 | s | 5 | 30 | |

**Table A.8.15.2.1-2: Cell specific test parameters for E-UTRAN FDD-TDD inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 FDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |

| | | | | | |
|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.15.2.1-3: drx-Configuration to be used in E-UTRAN FDD-TDD inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf40 | sf1280 | |
| shortDRX | disable | disable | |

Note: For further information see clause 6.3.2 in TS 36.331.

**Table A.8.15.2.1-4: *TimeAlignmentTimer* and *sr-ConfigIndex* -Configuration to be used in E-UTRAN FDD-TDD inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells**

| Field | Test1 | Test2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.15.2.2 Test Requirements

In Test1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

In Test2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 20*1280ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.15.3 E-UTRAN FDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps

### A.8.15.3.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.1.2.3.8.

The test scenario comprises of one E-UTRA FDD carrier and one E-UTRA TDD carrier and one cell on each carrier as given in tables A.8.15.3-1 and A.8.15.3-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.15.3-1: General test parameters for E-UTRAN FDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Cell1 PDSCH parameters | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1 |
| Cell1 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Cell2 PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF channel number | | 1, 2 | One FDD and one TDD carrier frequency are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2. |
| CP length | | Normal | |
| Cell 2 Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. |
| Cell 2 Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Time offset between cells | ms | 3 | Asynchronous cells |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.15.3-2: Cell specific test parameters for E-UTRAN FDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.2.1 (OP.2 TDD) | | OP.10 FDD | OP.10 FDD | OP.10 FDD | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.15.3.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 60 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.3.5.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.16 E-UTRAN Carrier Aggregation Measurements

## A.8.16.1 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX

### A.8.16.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.1.1-1 and A.8.16.1.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.16.1.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |

| | | | | |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤12 | UE shall report Event A6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 1.6s for cells 1 and 2, respectively. |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.1.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| Propagation Condition | | ETU70 | | | | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.16.1.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.2 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX

### A.8.16.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.2.1-1 and A.8.16.2.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.16.2.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤12 | UE shall report Event A6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 1.6s for cells 1 and 2, respectively. |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.2.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| Propagation Condition | | ETU70 | | | | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.16.2.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 6.4s (20× measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.3 E-UTRAN FDD-FDD Event triggered reporting on deactivated SCell with PCell interruption in non-DRX

### A.8.16.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.3.1-1 and A.8.16.3.1-2 below. In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is deactivated SCell, and Cell3 is the neighbour cell. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.16.3.1-1: General test parameters for E-UTRAN FDD-FDD Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |

| | | | | |
|---|---|---|---|---|
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 1280 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| OCNG Pattern defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2) | | OP.10 FDD | | OP.2 FDD | | OP.2 FDD | |
| | | | | | | | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.16.3.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.3A E-UTRAN FDD-FDD Event triggered reporting on deactivated SCell with network controlled PCell interruption in non-DRX

### A.8.16.3A.1 Test Purpose and Environment

The purpose of this test is to verify that the UE configured with the network controlled small gap correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on the controlled interruption in clause 7.8.2.6.

The test parameters are given in Table A.8.16.3A.1-1 and A.8.16.3A.1-2 below. In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is deactivated SCell, and Cell3 is the neighbour cell. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. UE is also configured with the network controlled small gap of pattern Id 0 with gapOffset of zero. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously according to the unicast PDSCH scheduling pattern in Table A.8.16.3A.1-1 to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.16.3A.1-1: General test parameters for E-UTRAN FDD-FDD Event triggered reporting on configured but deactivated SCell with network controlled PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.3 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle | ms | 320 | |
| Cell2 timing offset to cell1 | µs | 0 | |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | µs | 3 | Synchronous cells |
| NCSG Pattern Id / gapOffset | | 0 / 0 | (VIL1,ML,VIL2) = (1,4,1) for downlink and (1,4,2) for uplink |
| T1 | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.3A.1-2: Cell specific test parameters for E-UTRAN FDD-FDD Event triggered reporting on configured but deactivated SCell with network controlled PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| OCNG Pattern defined in A.3.2.1.10 (OP.10 FDD) and in A.3.2.1.2 (OP.2) | | OP.10 FDD | | OP.2 FDD | | OP.2 FDD | |
| | | | | | | | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.16.3A.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 6.4s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least [100]% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.4 E-UTRAN TDD-TDD Event triggered reporting on deactivated SCell with PCell interruption in non-DRX

### A.8.16.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.4.1-1 and A.8.16.4.1-2 below. In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is deactivated SCell, and Cell3 is the neighbour cell. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.16.4.1-1: General test parameters for E-UTRAN TDD-TDD Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 1280 | |
| Cell2 timing offset to cell1 | | µs | 0 | |

| | | | |
|---|---|---|---|
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | µs | 3 | Synchronous cells |
| T1 | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.4.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | |
| | | | | | | | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.16.4.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.16.4A E-UTRAN TDD-TDD Event triggered reporting on deactivated SCell with PCell interruption in non-DRX

## A.8.16.4A.1 Test Purpose and Environment

The purpose of this test is to verify that the UE configured with the network controlled small gap correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on the controlled interruption in clause 7.8.2.6.

The test parameters are given in Table A.8.16.4A.1-1 and A.8.16.4A.1-2 below. In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is deactivated SCell, and Cell3 is the neighbour cell. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. UE is also configured with the network controlled small gap of pattern Id 0 and gapOffset of zero. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously according to the unicast PDSCH scheduling pattern in Table A.8.16.4A.1-1 to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.16.4A.1-1: General test parameters for E-UTRAN TDD-TDD Event triggered reporting on configured but deactivated SCell with network controlled PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 320 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| NCSG pattern Id / gap Offset | | | 0 / 0 | (VIL1,ML,VIL2) = (1,4,1) for downlink, and (1,4,2) for uplink |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |

| | | | |
|---|---|---|---|
| T2 | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.4A.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Event triggered reporting on configured but deactivated SCell with network controlled PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | |
| | | | | | | | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -82 | -82 | -82 | -82 | -Infinity | -82 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.16.4A.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 6.4s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least [100]% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.16.5 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX for 20 MHz bandwidth

## A.8.16.5.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.5.1-1 and A.8.16.5.1-2 will replace the values of corresponding parameters in Tables A.8.16.1.1-1 and A.8.16.1.1-2.

**Table A.8.16.5.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 20 MHz**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.4 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.10 FDD | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 20 | Channel bandwidth for cells on primary and secondary component carriers |
| A2 | Threshold RSRP | dBm | -96 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| Note 1: See Table A.8.16.1.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.5.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 20 MHz**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.1.11 (OP.11 FDD) and in A.3.2.1.12 (OP.12 FDD) | | OP.11 FDD | | | OP.12 FDD | | | OP.12 FDD | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| | | | | | | | | | | |
| Note: See Table A.8.16.1.1-2 for other cell-specific test parameters. | | | | | | | | | | |

## A.8.16.5.2 Test Requirements

The test requirements defined in section A.8.16.1.2 shall apply to this test case.

# A.8.16.6 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 20 MHz bandwidth

## A.8.16.6.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.2. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.6.1-1 and A.8.16.6.1-2 will replace the values of corresponding parameters in Tables A.8.16.2.1-1 and A.8.16.2.1-2.

**Table A.8.16.6.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 20 MHz**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PDSCH parameters | | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | | DL Reference Measurement Channel R.10 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 20 | Channel bandwidth for cells on primary and secondary component carriers |
| A2 | Threshold RSRP | dBm | -96 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| Note 1: See Table A.8.16.2.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.6.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 20 MHz**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.8 (OP.8 TDD) | | OP.7 TDD | | | OP.8 TDD | | | OP.8 TDD | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| Note: See Table A.8.16.2.1-2 for other cell-specific test parameters. | | | | | | | | | | |

## A.8.16.6.2 Test Requirements

The test requirements defined in section A.8.16.2.2 shall apply to this test case.

# A.8.16.7 E-UTRA FDD event triggered reporting on deactivated SCell with PCell interruption in non-DRX for 20 MHz bandwidth

## A.8.16.7.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.3. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.7.1-1 and A.8.16.7.1-2 will replace the values of corresponding parameters in Tables A.8.16.3.1-1 and A.8.16.3.1-2.

**Table A.8.16.7.1-1: General test parameters for E-UTRAN FDD event-triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 20 MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 FDD | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | Channel bandwidth for cells on primary and secondary component carriers |
| Note 1: See Table A.8.16.3.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.7.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 20 MHz**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 20 | | 20 | |
| OCNG Patterns defined in A.3.2.1.17 (OP.17 FDD) and in A.3.2.1.12 (OP.12 FDD) | | OP.17 FDD | | OP.12 FDD | | OP.12 FDD | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | -101 | | | |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Note: See Table A.8.16.3.1-2 for other cell-specific test parameters. | | | | | | | |

### A.8.16.7.2 Test Requirements

The test requirements defined in section A.8.16.3.2 shall apply to this test case.

## A.8.16.8 E-UTRA TDD event triggered reporting on deactivated SCell with PCell interruption in non-DRX for 20 MHz bandwidth

### A.8.16.8.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.4. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.8.1-1 and A.8.16.8.1-2 will replace the values of corresponding parameters in Tables A.8.16.4.1-1 and A.8.16.4.1-2.

**Table A.8.16.8.1-1: General test parameters for E-UTRAN TDD event-triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 20 MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | Channel bandwidth for cells on primary and secondary component carriers |
| Note 1: See Table A.8.16.4.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.8.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 20 MHz**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 20 | | 20 | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.8 (OP.8 TDD) | | OP.7 TDD | | OP.8 TDD | | OP.8 TDD | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | -101 | | | |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Note: See Table A.8.16.4.1-2 for other cell-specific test parameters. | | | | | | | |

### A.8.16.8.2 Test Requirements

The test requirements defined in section A.8.16.4.2 shall apply to this test case.

## A.8.16.9 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX for 10MHz+5MHz

### A.8.16.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.1.1.

The test parameters are the same as defined in Subclause A.8.16.1.1 except those described in the following section. The listed parameter values in Tables A.8.16.9.1-1 and A.8.16.9.1-2 will replace the values of corresponding parameters in Tables A.8.16.1.1-1 and A.8.16.1.1-2.

**Table A.8.16.9.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for 10MHz+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Channel bandwidth for cells on primary carriers ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary carriers |
| Channel bandwidth for cells on secondary carriers ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary carriers |
| Note 1: See Table A.8.16.1.1-1 for the other general parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.9.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for 10MHz+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | | 5 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | | | N/A | | | N/A | | |
| PDSCH allocation | $n_{PRB}$ | 13—36 | | | N/A | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | R.6 FDD | | | R.11 FDD | | | R.11 FDD | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.1 FDD | | | OP.16 FDD | | | OP.16 FDD | | |
| Note 1: See Table A.8.16.1.1-2 for the other specific parameters. | | | | | | | | | | |

### A.8.16.9.2 Test Requirements

The test requirements defined in section A.8.16.1.2 shall apply to this test case.

## A.8.16.10 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 10MHz+5MHz

### A.8.16.10.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.2.1.

The test parameters are the same as defined in Subclause A.8.16.2.1 except those described in the following section. The listed parameter values in Tables A.8.16.10.1-1 and A.8.16.10.1-2 will replace the values of corresponding parameters in Tables A.8.16.2.1-1 and A.8.16.2.1-2.

**Table A.8.16.10.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for 10MHz+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Channel bandwidth for cells on primary carriers ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary carriers |
| Channel bandwidth for cells on secondary carriers ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary carriers |
| Note 1: See Table A.8.16.2.1-1 for the other general parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.10.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for 10MHz+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | | 5 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | | | N/A | | | N/A | | |
| PDSCH allocation | $n_{PRB}$ | 13—36 | | | N/A | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.2 | | R.6 TDD | | | R.11 TDD | | | R.11 TDD | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.1 TDD | | | OP.10 TDD | | | OP.10 TDD | | |
| Note 1: See Table A.8.16.2.1-2 for the other specific parameters. | | | | | | | | | | |

### A.8.16.10.2 Test Requirements

The test requirements defined in section A.8.16.2.2 shall apply to this test case.

## A.8.16.11 E-UTRAN FDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz

### A.8.16.11.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.3. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.11.1-1 and A.8.16.11.1-2 will replace the values of corresponding parameters in Tables A.8.16.3.1-1 and A.8.16.3.1-2.

**Table A.8.16.11.1-1: General test parameters for E-UTRAN FDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Channel bandwidth for cells on primary carrier ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary component carrier |
| PDSCH parameters for cells on primary carriers | | DL Reference Measurement Channel R.3 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters for cells on primary carriers | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.2.1 |
| Channel bandwidth for cells on secondary carriers ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary component carrier |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters for cells on secondary carrier | | DL Reference Measurement Channel R.11 FDD | As specified in section A.3.1.2.1 |
| Note 1: See Table A.8.16.3.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.11.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.1 | | OP.10 FDD | | OP.16 FDD | | OP.16 FDD | |
| Note: See Table A.8.16.3.1-2 for other cell-specific test parameters. | | | | | | | |

## A.8.16.11.2 Test Requirements

The test requirements defined in section A.8.16.3.2 shall apply to this test case.

# A.8.16.12 E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz

## A.8.16.12.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.4. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.12.1-1 and A.8.16.12.1-2 will replace the values of corresponding parameters in Tables A.8.16.4.1-1 and A.8.16.4.1-2.

**Table A.8.16.12.1-1: General test parameters for E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Channel bandwidth for cells on primary carrier ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary component carrier |
| PDSCH parameters for cells on primary carriers | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters for cells on primary carriers | | DL Reference Measurement Channel R.6 TDD | As specified in section A.3.1.2.2 |
| Channel bandwidth for cells on secondary carriers ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary component carrier |
| PCFICH/PDCCH/PHICH parameters for cells on secondary carrier | | DL Reference Measurement Channel R.11 TDD | As specified in section A.3.1.2.2 |
| Note 1: See Table A.8.16.4.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.12.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 10MHz+5MHz**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.2 | | OP.1 TDD | | OP.10 TDD | | OP.10 TDD | |
| Note: See Table A.8.16.4.1-2 for other cell-specific test parameters. | | | | | | | |

## A.8.16.12.2 Test Requirements

The test requirements defined in section A.8.16.4.2 shall apply to this test case.

# A.8.16.13 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX for 5MHz +5 MHz bandwidth

## A.8.16.13.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.13.1-1 and A.8.16.13.1-2 will replace the values of corresponding parameters in Tables A.8.16.1.1-1 and A.8.16.1.1-2.

**Table A.8.16.13.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 5MHz +5 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on primary component carrier |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary component carrier |
| Note 1: See Table A.8.16.1.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.13.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 5MHz +5 MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15.FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | | | OP.16 FDD | | | OP.16 FDD | | |
| Note: See Table A.8.16.1.1-2 for other cell-specific test parameters. | | | | | | | | | | |

## A.8.16.13.2 Test Requirements

The test requirements defined in section A.8.16.1.2 shall apply to this test case.

# A.8.16.14 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 5 MHz +5 MHz bandwidth

## A.8.16.14.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.2. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.14.1-1 and A.8.16.14.1-2 will replace the values of corresponding parameters in Tables A.8.16.2.1-1 and A.8.16.2.1-2.

**Table A.8.16.14.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 5 MHz +5 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.4.TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on primary component carrier |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on secondary component carrier |

| | |
|---|---|
| Note 1: | See Table A.8.16.2.1-1 for other general test parameters. |
| Note 2: | This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. |

**Table A.8.16.14.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions, 5 MHz +5 MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.2.9 (OP.9 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.9 TDD | | | OP.10 TDD | | | OP10 TDD | | |
| Note: See Table A.8.16.2.1-2 for other cell-specific test parameters. | | | | | | | | | | |

## A.8.16.14.2 Test Requirements

The test requirements defined in section A.8.16.2.2 shall apply to this test case.

# A.8.16.15 E-UTRA FDD event triggered reporting on deactivated SCell with PCell interruption in non-DRX for 5 +5 MHz bandwidth

## A.8.16.15.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.3. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.15.1-1 and A.8.16.14.1-2 will replace the values of corresponding parameters in Tables A.8.16.3.1-1 and A.8.16.3.1-2.

**Table A.8.16.15.1-1: General test parameters for E-UTRAN FDD event-triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 5 + 5 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.7 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on primary and secondary component carriers |
| Note 1: See Table A.8.16.3.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.15.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 5+5 MHz bandwidth**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.1.20 (OP.20 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.20 FDD | | OP.16 FDD | | OP.16 FDD | |
| Note: See Table A.8.16.3.1-2 for other cell-specific test parameters. | | | | | | | |

## A.8.16.7.2 Test Requirements

The test requirements defined in section A.8.16.3.2 shall apply to this test case.

# A.8.16.16 E-UTRA TDD event triggered reporting on deactivated SCell with PCell interruption in non-DRX for 5+5 MHz bandwidth

## A.8.16.16.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.4. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.16.1-1 and A.8.16.16.1-2 will replace the values of corresponding parameters in Tables A.8.16.4.1-1 and A.8.16.4.1-2.

**Table A.8.16.16.1-1: General test parameters for E-UTRAN TDD event-triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 5+5 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.4 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | Channel bandwidth for cells on primary and secondary component carriers |
| Note 1: See Table A.8.16.4.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.16.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX, 5+5 MHz bandwidth**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| OCNG Patterns defined in A.3.2.2.9 (OP.9 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.9 TDD | | OP.10 TDD | | OP.10 TDD | |
| Note: See Table A.8.16.4.1-2 for other cell-specific test parameters. | | | | | | | |

## A.8.16.16.2 Test Requirements

The test requirements defined in section A.8.16.4.2 shall apply to this test case.

# A.8.16.17 E-UTRAN FDD activation and deactivation of known SCell in non-DRX

## A.8.16.17.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.17.1-1 and cell-specific parameters in A.8.16.17.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+24). The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.17.1-1: General test parameters for known SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| Cell2 timing offset to cell1 | µs | 0 | |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.17.1-2: Cell specific test parameters for E-UTRAN FDD known SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.10 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |

| | | | |
|---|---|---|---|
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

### A.8.16.17.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+10) if the suframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.17A E-UTRAN FDD activation and deactivation of known SCell in non-DRX for 20MHz

### A.8.16.17A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.17. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.17A.1-1 and A.8.16.17A.1-2 will replace the values of corresponding parameters in Tables A.8.16.17.1-1 and A.8.16.17.1-2.

**Table A.8.16.17A.1-1: General test parameters for known SCell activation case, 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 FDD | As specified in section A.3.1.2.1 |

**Table A.8.16.17A.1-2: Cell specific test parameters for E-UTRAN FDD known SCell activation, 20MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.1.17 (OP.17 FDD) and in A.3.2.1.12 (OP.12 FDD) | | OP.17 FDD | | | OP.12.FDD | | |

### A.8.16.17A.2 Test Requirements

The test requirements defined in section A.8.16.17.2 shall apply to this test case.

## A.8.16.17B E-UTRAN FDD activation and deactivation of known SCell in non-DRX for 10MHz + 5MHz

### A.8.16.17B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.17. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.17B.1-1 and A.8.16.17B.1-2 will replace the values of corresponding parameters in Tables A.8.16.17.1-1 and A.8.16.17.1-2.

**Table A.8.16.17B.1-1: General test parameters for known SCell activation case, 10+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD (Cell 1)<br>DL Reference Measurement Channel R.11 FDD (Cell 2) | As specified in section A.3.1.2.1 |

**Table A.8.16.17B.1-2: Cell specific test parameters for E-UTRAN FDD known SCell activation, 10+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.11 (OP.11 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.10 FDD | | | OP.16.FDD | | |

### A.8.16.17B.2 Test Requirements

The test requirements defined in section A.8.16.17.2 shall apply to this test case.

## A.8.16.17C E-UTRAN FDD activation and deactivation of known SCell in non-DRX for 5MHz + 5MHz

### A.8.16.17C.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.17. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.17C.1-1 and A.8.16.17C.1-2 will replace the values of corresponding parameters in Tables A.8.16.17.1-1 and A.8.16.17.1-2.

**Table A.8.16.17C.1-1: General test parameters for known SCell activation case, 5+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.7 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in section A.3.1.2.1 |

**Table A.8.16.17C.1-2: Cell specific test parameters for E-UTRAN FDD known SCell activation, 5+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |

| | | | |
|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.20 FDD | OP.16.FDD |

### A.8.16.17C.2 Test Requirements

The test requirements defined in section A.8.16.17.2 shall apply to this test case.

## A.8.16.18 E-UTRAN TDD activation and deactivation of known SCell in non-DRX

### A.8.16.18.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.18.1-1 and cell-specific parameters in A.8.16.18.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+24). The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n where n is 4 or 9, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.18.1-1: General test parameters for known SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in section A.3.1.2.2 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | |
| DRX | | OFF | Continuous monitoring of primary cell |

| | | | |
|---|---|---|---|
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| Cell2 timing offset to cell1 | µs | 0 | |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | µs | 3 | Synchronous cells |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configuredand detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.18.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

## A.8.16.18.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframes (m+8) and (m+9) were subject to interruption when an intra-band

SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (m+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.18A E-UTRAN TDD activation and deactivation of known SCell in non-DRX for 20MHz

## A.8.16.18A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.18. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.18A.1-1 and A.8.16.18A.1-2 will replace the values of corresponding parameters in Tables A.8.16.18.1-1 and A.8.16.18.1-2.

**Table A.8.16.18A.1-1: General test parameters for known SCell activation case, 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | As specified in section A.3.1.2.2 |

**Table A.8.16.18A.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation, 20MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.7 TDD | | | OP.8.TDD | | |

## A.8.16.18A.2 Test Requirements

The test requirements defined in section A.8.16.18.2 shall apply to this test case.

# A.8.16.18B E-UTRAN TDD activation and deactivation of known SCell in non-DRX for 10MHz + 5MHz

## A.8.16.18B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.18. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.18B.1-1 and A.8.16.18B.1-2 will replace the values of corresponding parameters in Tables A.8.16.18.1-1 and A.8.16.18.1-2.

**Table A.8.16.18B.1-1: General test parameters for known SCell activation case, 10 + 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD (cell 1)<br>DL Reference Measurement Channel R.11 TDD (cell 2) | As specified in section A.3.1.2.2 |

**Table A.8.16.18B.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation, 10 + 5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.1 TDD | | | OP.10.TDD | | |

## A.8.16.18B.2 Test Requirements

The test requirements defined in section A.8.16.18.2 shall apply to this test case.

# A.8.16.18C E-UTRAN TDD activation and deactivation of known SCell in non-DRX for 5MHz + 5MHz

## A.8.16.18C.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.18. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.18C.1-1 and A.8.16.18C.1-2 will replace the values of corresponding parameters in Tables A.8.16.18.1-1 and A.8.16.18.1-2.

**Table A.8.16.18C.1-1: General test parameters for known SCell activation case, 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.4 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 TDD | As specified in section A.3.1.2.2 |

**Table A.8.16.18C.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation, 5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.2.9 (OP.9 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.9 TDD | | | OP.10.TDD | | |

## A.8.16.18C.2 Test Requirements

The test requirements defined in section A.8.16.18.2 shall apply to this test case.

# A.8.16.18D E-UTRAN TDD activation and deactivation of known SCell in non-DRX for 20MHz + 10MHz

## A.8.16.18D.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.18. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.18D.1-1 and A.8.16.18D.1-2 will replace the values of corresponding parameters in Tables A.8.16.18.1-1 and A.8.16.18.1-2.

**Table A.8.16.18D.1-1: General test parameters for known SCell activation case, 20 + 10MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD (cell 1)<br>DL Reference Measurement Channel R.6 TDD (cell 2) | As specified in section A.3.1.2.2 |

**Table A.8.16.18D.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation, 20 + 10MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.7 TDD | | | OP.2.TDD | | |

### A.8.16.18D.2 Test Requirements

The test requirements defined in section A.8.16.18.2 shall apply to this test case.

## A.8.16.19 E-UTRAN FDD activation and deactivation of unknown SCell in non-DRX

### A.8.16.19.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.19.1-1 and cell-specific parameters in A.8.16.19.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Cell 1 has constant signal level throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (cell2) becomes configured on radio channel 2 (SCC). During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 2 is increased to same level as for cell 1. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+34) provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.19.1-1: General test parameters for unknown SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| Cell2 timing offset to cell1 | µs | 0 | |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | ms | 100 | During this time the PCell shall be known and the SCell configured, but not dectected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.19.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -infinity | 17 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | |
| Propagation Condition | | AWGN | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. |

### A.8.16.19.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 Interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 Interruption of PCell during SCell1 deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation and deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.19A E-UTRAN FDD activation and deactivation of unknown SCell in non-DRX for 20MHz

### A.8.16.19A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.19. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.19A.1-1 and A.8.16.19A.1-2 will replace the values of corresponding parameters in Tables A.8.16.19.1-1 and A.8.16.19.1-2.

**Table A.8.16.19A.1-1: General test parameters for unknown SCell activation case, 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 FDD | As specified in section A.3.1.2.1 |

**Table A.8.16.19A.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell activation, 20MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.1.17 (OP.17 FDD) and in A.3.2.1.12 (OP.12 FDD) | | OP.17 FDD | | | OP.12.FDD | | |

### A.8.16.19A.2 Test Requirements

The test requirements defined in section A.8.16.19.2 shall apply to this test case.

# A.8.16.19B E-UTRAN FDD activation and deactivation of unknown SCell in non-DRX for 10MHz + 5MHz

## A.8.16.19B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.19. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.19B.1-1 and A.8.16.19B.1-2 will replace the values of corresponding parameters in Tables A.8.16.19.1-1 and A.8.16.19.1-2.

**Table A.8.16.19B.1-1: General test parameters for unknown SCell activation case, 10+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD (Cell 1)<br>DL Reference Measurement Channel R.11 FDD (Cell 2) | As specified in section A.3.1.2.1 |

**Table A.8.16.19B.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell activation, 10+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | |
| OCNG Patterns defined in A.3.2.1.11 (OP.11 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.10 FDD | | | OP.16.FDD | | |

## A.8.16.19B.2 Test Requirements

The test requirements defined in section A.8.16.19.2 shall apply to this test case.

# A.8.16.19C E-UTRAN FDD activation and deactivation of unknown SCell in non-DRX for 5MHz + 5MHz

## A.8.16.19C.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.19. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.19C.1-1 and A.8.16.19C.1-2 will replace the values of corresponding parameters in Tables A.8.16.19.1-1 and A.8.16.19.1-2.

**Table A.8.16.19C.1-1: General test parameters for unknown SCell activation case, 5+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.7 FDD (Cell 1) | As specified in section A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in section A.3.1.2.1 |

**Table A.8.16.19C.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell activation, 5+5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |

| | | | |
|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and in A.3.2.1.16 (OP.16 FDD) | | OP.20 FDD | OP.16.FDD |

### A.8.16.19C.2 Test Requirements

The test requirements defined in section A.8.16.19.2 shall apply to this test case.

## A.8.16.20 E-UTRAN TDD activation and deactivation of unknown SCell in non-DRX

### A.8.16.20.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.20.1-1 and cell-specific parameters in A.8.16.20.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Cell 1 has constant signal level throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (cell2) becomes configured on radio channel 2 (SCC). During T1 the signal level of SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 2 is increased to same level as for cell 1. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+34) provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.20.1-1: General test parameters for unknown SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in section A.3.1.2.2 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| Cell2 timing offset to cell1 | µs | 0 | |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | µs | 3 | Synchronous cells |
| T1 | ms | 100 | During this time the PCell shall be known and the SCell configured, but not dectected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.20.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -infinity | 17 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

## A.8.16.20.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell at in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframes (m+8) and (m+9) were subject to interruption when an intra-

band SCell is activated. Whether first CSI report was interrupted or not is checked by monitoring ACK/NACK sent in PCell at the same time as the first CSI report.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 Interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 Interruption of PCell during SCell1 deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay to be counted as correct. The rate of correct observed SCell activation and deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.20A E-UTRAN TDD activation and deactivation of unknown SCell in non-DRX for 20MHz

## A.8.16.20A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.20. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.20A.1-1 and A.8.16.20A.1-2 will replace the values of corresponding parameters in Tables A.8.16.20.1-1 and A.8.16.20.1-2.

**Table A.8.16.20A.1-1: General test parameters for unknown SCell activation case, 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in section A.3.1.2.2 |

**Table A.8.16.20A.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation, 20MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 20 | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.7 TDD | | | OP.2.TDD | | |

## A.8.16.20A.2 Test Requirements

The test requirements defined in section A.8.16.20.2 shall apply to this test case.

# A.8.16.20B E-UTRAN TDD activation and deactivation of unknown SCell in non-DRX for 10MHz + 5MHz

## A.8.16.20B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.20. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.20B.1-1 and A.8.16.20B.1-2 will replace the values of corresponding parameters in Tables A.8.16.20.1-1 and A.8.16.20.1-2.

**Table A.8.16.20B.1-1: General test parameters for unknown SCell activation case, 10 + 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in section A.3.1.1.2 |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD (cell 1)<br>DL Reference Measurement Channel R.12 TDD (cell 2) | As specified in section A.3.1.2.2 |

**Table A.8.16.20B.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation, 10 + 5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 5 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.1 TDD | | | OP.10.TDD | | |

## A.8.16.20B.2 Test Requirements

The test requirements defined in section A.8.16.20.2 shall apply to this test case.

# A.8.16.20C E-UTRAN TDD activation and deactivation of unknown SCell in non-DRX for 5MHz + 5MHz

## A.8.16.20C.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.20. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.20C.1-1 and A.8.16.20C.1-2 will replace the values of corresponding parameters in Tables A.8.16.20.1-1 and A.8.16.20.1-2.

**Table A.8.16.20C.1-1: General test parameters for unknown SCell activation case, 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.4 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 TDD | As specified in section A.3.1.2.2 |

**Table A.8.16.20C.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation, 5MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 | | | 5 | | |
| OCNG Patterns defined in A.3.2.2.9 (OP.9 TDD) and in A.3.2.2.10 (OP.10 TDD) | | OP.9 TDD | | | OP.10.TDD | | |

## A.8.16.20C.2 Test Requirements

The test requirements defined in section A.8.16.20.2 shall apply to this test case.

# A.8.16.20D E-UTRAN TDD activation and deactivation of unknown SCell in non-DRX for 20MHz + 10MHz

## A.8.16.20D.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.20. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.16.20D.1-1 and A.8.16.20D.1-2 will replace the values of corresponding parameters in Tables A.8.16.20.1-1 and A.8.16.20.1-2.

**Table A.8.16.20D.1-1: General test parameters for unknown SCell activation case, 20 + 10MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD (cell 1)<br>DL Reference Measurement Channel R.6 TDD (cell 2) | As specified in section A.3.1.2.2 |

**Table A.8.16.20D.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation, 20 + 10MHz bandwidth**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 20 | | | 10 | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.7 TDD | | | OP.2.TDD | | |

## A.8.16.20D.2 Test Requirements

The test requirements defined in section A.8.16.20.2 shall apply to this test case.

# A.8.16.21 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 20MHz+10MHz

## A.8.16.21.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.2.

The test parameters are given in Tables A.8.16.21.1-1 and A.8.16.21.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.16.21.1-1: E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 20MHz+10MHz**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -96 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |

| | | | | |
|---|---|---|---|---|
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤12 | UE shall report Event A6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 1.6s for cells 1 and 2, respectively. |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section C.3.3.1. | | | | |

**Table A.8.16.21.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 20MHz+10MHz**

| Parameter | Unit | Combination | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | All | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | | 20MHz+10MHz | 20MHz: $N_{RB,c}$ = 100 | | | 10MHz: $N_{RB,c}$ = 50 | | | 10MHz: $N_{RB,c}$ = 50 | | |
| | | 10MHz+20MHz | 10MHz: $N_{RB,c}$ = 50 | | | 20MHz: $N_{RB,c}$ = 100 | | | 20MHz: $N_{RB,c}$ = 100 | | |
| Correlation Matrix and Antenna Configuration | | All | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 20MHz+10MHz | R.3 TDD | | | N/A | | | N/A | | |
| | | 10MHz+20MHz | R.0 TDD | | | N/A | | | N/A | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 20MHz+10MHz | R.10 TDD | | | R.6 TDD | | | R.6 TDD | | |
| | | 10MHz+20MHz | R.6 TDD | | | R.10 TDD | | | R.10 TDD | | |
| OCNG Patterns defined in A.3.2.2 | | 20MHz+10MHz | OP.7 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| | | 10MHz+20MHz | OP.1 TDD | | | OP.8 TDD | | | OP.8 TDD | | |
| PBCH_RA | dB | All | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | All | -104 | | | -104 | | | | | |
| RSRP Note 3 | dBm/15 kHz | All | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |
| $\hat{E}_s/I_{ot}$ | dB | All | 19 | 19 | -3 | 19.00 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | All | -85 | -85 | -107 | -85 | -85 | -107 | -infinity | -85 | -107 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | All | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| Propagation Condition | | All | ETU70 | | | | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.16.21.2 Test Requirements

The test requirements defined in section A.8.16.2.2 shall apply to this test case.

## A.8.16.22 E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 20MHz+10MHz

### A.8.16.22.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.16.4.

The test parameters are given in Tables A.8.16.22.1-1 and A.8.16.22.1-2 below. In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is deactivated SCell, and Cell3 is the neighbour cell. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

**Table A.8.16.22.1-1: General test parameters for E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 20MHz+10MHz**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 1280 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |

| | | | |
|---|---|---|---|
| T2 | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.22.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 20MHz+10MHz**

| Parameter | Unit | Combination | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | All | 1 | | 2 | | 2 | |
| $BW_{channel}$ | | 20MHz+10MHz | 20MHz: $N_{RB,c}$ = 100 | | 10MHz: $N_{RB,c}$ = 50 | | 10MHz: $N_{RB,c}$ = 50 | |
| | | 10MHz+20MHz | 10MHz: $N_{RB,c}$ = 50 | | 20MHz: $N_{RB,c}$ = 100 | | 20MHz: $N_{RB,c}$ = 100 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 20MHz+10MHz | R.3 TDD | | N/A | | N/A | |
| | | 10MHz+20MHz | R.0 TDD | | N/A | | N/A | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 20MHz+10MHz | R.10 TDD | | R.6 TDD | | R.6 TDD | |
| | | 10MHz+20MHz | R.6 TDD | | R.10 TDD | | R.10 TDD | |
| OCNG Pattern defined in A.3.2.2 | | 20MHz+10MHz | OP.7 TDD | | OP.2 TDD | | OP.2 TDD | |
| | | 10MHz+20MHz | OP.1 TDD | | OP.8 TDD | | OP.8 TDD | |
| PBCH_RA | dB | All | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |
| PCFICH_RB | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDCCH_RA | dB | | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | All | -101 | | -101 | | | |
| RSRP Note 4 | dBm/15 kHz | All | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / I_{ot}$ | dB | All | 16 | 16 | 16 | -0.11 | -Infinity | -0.11 |
| SCH_RP Note 4 | dBm/15 kHz | All | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / N_{oc}$ | dB | All | 16 | 16 | 16 | 16 | -Infinity | 16 |
| Propagation Condition | | All | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.16.22.2 Test Requirements

The test requirements defined in section A.8.16.4.2 shall apply to this test case.

# A.8.16.23 E-UTRAN TDD-FDD CA Event Triggered Reporting Under Deactivated SCell in Non-DRX with PCell in FDD

## A.8.16.23.1 Test Purpose and Environment

The purpose of this test is to verify that in TDD-FDD CA with PCell in FDD the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements for SCell stated in clause 8.3.3.2.1 and the requirements for PCell stated in clause 8.3.2.

In this test case there are 3 cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the PCell on the FDD primary component carrier, Cell 2 is the configured and deactivated SCell on the TDD secondary component carrier, and Cell 3 is the neighbor cell on the TDD secondary component carrier. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At the beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

The test parameters are given in Table A.8.16.23.1-1 and A.8.16.23.1-2 below.

**Table A.8.16.23.1-1: General test parameters for E-UTRAN TDD-FDD CA event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤12 | UE shall report Event A6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 1.6s for cells 1 and 2, respectively. |

**Table A.8.16.23.1-2: Cell specific test parameters for E-UTRAN TDD-FDD CA event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns defined | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.17 +10log ($N_{RB,c}$ /50) | -56.13 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 3 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | N/A | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.23.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to 2×TTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.24 E-UTRAN TDD-FDD CA Event Triggered Reporting Under Deactivated SCell in Non-DRX with PCell in TDD

### A.8.16.24.1 Test Purpose and Environment

The purpose of this test is to verify that in TDD-FDD CA with PCell in TDD the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements for SCell stated in clause 8.3.3.2.1 and the requirements for PCell stated in clause 8.3.2.

In this test case there are 3 cells: Cell 1, Cell 2 and Cell 3. Cell 1 is the PCell on the TDD primary component carrier, Cell 2 is the configured and deactivated SCell on the FDD secondary component carrier, and Cell 3 is the neighbor cell on the FDD secondary component carrier. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At the beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

The test parameters are given in Table A.8.16.24.1-1 and Table A.8.16.24.1-2.

**Table A.8.16.24.1-1: General test parameters for E-UTRAN TDD-FDD CA event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | s | ≤12 | UE shall report Event A6 within 6.4s (20×scellMeasCycle) |
| T3 | s | 5 | UE shall report Event A2 within 200 ms and 1.6s for cells 1 and 2, respectively. |

**Table A.8.16.24.1-2: Cell specific test parameters for E-UTRAN TDD-FDD CA event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns defined | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.17 +10log ($N_{RB,c}$ /50) | -56.13 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |

| | | | | |
|---|---|---|---|---|
| Timing offset to Cell 1 | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.24.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell3 with a measurement reporting delay of less than 6.4s (20× measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to 2×TTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.25 E-UTRAN TDD-FDD CA Event triggered reporting on deactivated SCell with PCell interruption in non-DRX with PCell in FDD

### A.8.16.25.1 Test Purpose and Environment

The purpose of this test is to verify that in TDD-FDD CA with PCell in FDD the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 and the requirements for PCell stated in clause 8.3.2 while at the same time fulfilling the requirement on interruption rate.

In this test case there are three cells: Cell1, Cell2 and Cell3. Cell 1 is the PCell on the FDD primary component carrier, Cell 2 is the configured and deactivated SCell on the TDD secondary component carrier, and Cell 3 is the neighbor cell on the TDD secondary component carrier. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

The test parameters are given in Table A.8.16.25.1-1 and Table A.8.16.25.1-2 below.

**Table A.8.16.25.1-1: General test parameters for E-UTRAN TDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |

| | | | | |
|---|---|---|---|---|
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 1280 | |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |

**Table A.8.16.25.1-2: Cell specific test parameters for E-UTRAN TDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | - | | - | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns defined | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -101 | | -101 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -infinity | -0.11 |
| RSRP [Note 3] | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| SCH_RP [Note 3] | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 |
| Propagation Condition | | AWGN | | AWGN | | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low |
| Timing offset to Cell 1 | µs | - | | 0 | | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | | ≤ TAE | | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.25.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.26 E-UTRAN TDD-FDD CA Event triggered reporting on deactivated SCell with PCell interruption in non-DRX with PCell in TDD

### A.8.16.26.1 Test Purpose and Environment

The purpose of this test is to verify that in TDD-FDD CA with PCell in TDD the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 and the requirements for PCell stated in clause 8.3.2 while at the same time fulfilling the requirement on interruption rate.

In this test case there are three cells: Cell1, Cell2 and Cell3. Cell 1 is the PCell on the TDD primary component carrier, Cell 2 is the configured and deactivated SCell on the FDD secondary component carrier, and Cell 3 is the neighbor cell on the FDD secondary component carrier. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

The test parameters are given in Table A.8.16.26.1-1 and Table A.8.16.26.1-1 below.

**Table A.8.16.26.1-1: General test parameters for E-UTRAN TDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 1280 | |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |

**Table A.8.16.26.1-2: Cell specific test parameters for E-UTRAN TDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | | - | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns defined | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -101 | | -101 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 16 | 16 | -0.11 | -infinity | -0.11 |
| RSRP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| Io Note 3 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | |
| Propagation Condition | | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | | 0 | | 3 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | ≤ TAE | | N/A | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.26.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.27 3 DL PCell in FDD CA Event Triggered Reporting with 2 Deactivated SCells in Non-DRX

### A.8.16.27.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.27.1-1 and A.8.16.27.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 4. At the beginning of T2 the transmission power of cell 4 is increased to the same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2 and for Cell 3.

**Table A.8.16.27.1-1: General test parameters for E-UTRAN TDD-FDD 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbour cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3 and cell4). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3 and cell4). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1 and cell3 shall be known to the UE; but cell2 and cell 4 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell4 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms. 1.6s, and 1.6s for cells 1, 2 and 3, respectively. |

**Table A.8.16.27.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |

| | | | | | |
|---|---|---|---|---|---|
| Timing offset to Cell 1 | µs | - | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.27.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 4 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.28 3 DL PCell in TDD CA Event Triggered Reporting with 2 Deactivated SCells in Non-DRX

### A.8.16.28.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.28.1-1 and A.8.16.28.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 4. At the beginning of T2 the transmission power of cell 4 is increased to the same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2 and for Cell 3.

**Table A.8.16.28.1-1: General test parameters for E-UTRAN TDD-FDD 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbour cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to TDD cell (cell1). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to TDD cell (cell1). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |

| | | | | |
|---|---|---|---|---|
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of events A1 A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for events A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1 and cell3 shall be known to the UE; but cell2 and cell 4 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell4 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms. 1.6s, and 1.6s for cells 1, 2 and 3, respectively. |

**Table A.8.16.28.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |

| | | | | | |
|---|---|---|---|---|---|
| Timing offset to Cell 1 | µs | - | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.28.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 4 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.29 3 DL FDD CA Event Triggered Reporting under Deactivated SCells in Non-DRX

### A.8.16.29.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects Events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.29.1-1 and A.8.16.29.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (SCell 1), Events A2 (PCell and SCell 1/2) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 4. Immediately at beginning of T2 the transmission power of cell 2 is increased above a threshold value such that this shall result in reporting of Event A1 for SCell 1, and cell 4 is increased to the same level as for Cell 3. Due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell 1/2, respectively.

**Table A.8.16.29.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 (SCell 1) | Configured deactivated secondary cell 1 on RF channel number 2. |
| | | | Cell 3 (SCell 2) | Configured deactivated secondary cell 2 on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. No event A1 reporting is configured for cell 1 and 3. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier 1. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier 2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) for SCell 1 and 2 | | ms | 320 | |
| T1 | | s | 5 | During this time cell1 and cell3 shall be known to the UE; but cell2 and cell 4 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and Event A6 for cell4 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms, 1.6s and 1.6s for cells 1, 2 and 3, respectively. |

**Table A.8.16.29.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.05 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | |

| | | | | | |
|---|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 | 1x2 Low | 1x2 Low | 1x2 Low |
| Timing offset to Cell 1 | µs | - | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.29.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 4 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.30 3 DL TDD CA Event Triggered Reporting under Deactivated SCells in Non-DRX

### A.8.16.30.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects Events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.30.1-1 and A.8.16.30.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (SCell 1), Events A2 (PCell and SCell 1/2) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 4. Immediately at beginning of T2 the transmission power of cell 2 is increased above a threshold value such that this shall result in reporting of Event A1 for SCell 1, and cell 4 is increased to the same level as for Cell 3. Due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell 1/2, respectively.

**Table A.8.16.30.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 (SCell 1) | Configured deactivated secondary cell 1 on RF channel number 2. |
| | | | Cell 3 (SCell 2) | Configured deactivated secondary cell 2 on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. No event A1 reporting is configured for cell 1 and 3. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier 1. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier 2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) for SCell 1 and 2 | | ms | 320 | |
| T1 | | s | 5 | During this time cell1 and cell3 shall be known to the UE; but cell2 and cell 4 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and Event A6 for cell4 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms, 1.6s and 1.6s for cells 1, 2 and 3, respectively. |

**Table A.8.16.30.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.05 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | | |

| | | | | | |
|---|---|---|---|---|---|
| Propagation Condition | | AWGN | ETU70 | ETU70 | ETU70 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low |
| Timing offset to Cell 1 | μs | - | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | μs | - | - | ≤ TAE | N/A |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.<br>Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. | | | | | |

### A.8.16.30.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 4 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in PDCCH.

## A.8.16.31 E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in FDD

### A.8.16.31.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.31.1-1 and A.8.16.31.1-2 below. In the test there are four cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), and Cell 3 is SCell on the TDD secondary component (RF Channel 3) and Cell 4 is the neighbour cell on the TDD secondary component (RF Channel 3). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, both Cell2 and Cell3 are deactivated. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 4 is turned off and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 remains deactivated. Immediately at beginning of T4 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell 2 during T4.

**Table A.8.16.31.1-1: General test parameters for E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | Normal | |

| | | | | |
|---|---|---|---|---|
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.31.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in FDD**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 3 | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 and A.3.2.2 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -Infinity | 16 | -Infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | -Infinity | -0.11 | -Infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 prior to the start of time period T2 and on cell2 prior to the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.31.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the start of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.32 E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in TDD

### A.8.16.32.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.32.1-1 and A.8.16.32.1-2 below. In the test there are four cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), and Cell 3 is SCell on the FDD secondary component (RF Channel 3) and Cell 4 is the neighbour cell on the FDD secondary component (RF Channel 3). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, both Cell2 and Cell3 are deactivated. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 4 is turned off and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 4 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.32.1-1: General test parameters for E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured SCell | | Cell 2 | Configured secondary cell on RF channel number 2. |
| Configured SCell | | Cell 3 | Configured secondary cell on RF channel number 3. |
| Neighbour cell | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | Normal | |

| | | | | |
|---|---|---|---|---|
| Special subframe configuration on PCell | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration on PCell | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.32.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell in TDD**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 3 | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP. 7 TDD | | | | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : OP.14 FDD | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : OP.14 FDD | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : OP.14 FDD | 5MHz: OP.20 FDD; 10MHz :OP.10 FDD; 20MHz : OP.17 FDD | 5MHz: OP.16FDD;<br>10MHz:OP.2 FDD;<br>20MHz: OP.12FDD | | | | 5MHz: OP.16FDD;<br>10MHz:OP.2 FDD;<br>20MHz: OP.12FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -Infinity | 16 | -Infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | -Infinity | -0.11 | -Infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | - | | | | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note5 | μs | - | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note5 | μs | - | | | | - | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 prior to the start of time period T2 and on cell2 prior to the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.32.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.33 E-UTRAN FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.33.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.33.1-1 and A.8.16.33.1-2 below. In the test there are four cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), and Cell 3 is SCell on the FDD secondary component (RF Channel 3) and Cell 4 is the neighbour cell on the FDD secondary component (RF Channel 3). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, both Cell2 and Cell3 are deactivated. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 4 is turned off and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 4 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.33.1-1: General test parameters for E-UTRAN FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |

| | | | | |
|---|---|---|---|---|
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.33.1-2: Cell specific test parameters for E-UTRAN FDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #1 and Cell #2)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 3 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -Infinity | 16 | -Infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | -Infinity | -0.11 | -Infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -54.15+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -54.15+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -54.15+10log($N_{RB,c}$/50) | -57.11+10log($N_{RB,c}$/50) | -54.15+10log($N_{RB,c}$/50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | - | | | | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | μs | - | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | μs | - | | | | - | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.33.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.34 E-UTRAN TDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.34.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.34.1-1 and A.8.16.34.1-2 below. In the test there are four cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), and Cell 3 is SCell on the TDD secondary component (RF Channel 3) and Cell 4 is the neighbour cell on the TDD secondary component (RF Channel 3). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, both Cell2 and Cell3 are deactivated. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 4 is turned off and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 remains deactivated. Immediately at beginning of T4 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell 2 during T4.

**Table A.8.16.34.1-1: General test parameters for E-UTRAN TDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |

| | | | | |
|---|---|---|---|---|
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.34.1-2: Cell specific test parameters for E-UTRAN TDD 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 3 | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -Infinity | 16 | -Infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | -Infinity | -0.11 | -Infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 prior to the start of time period T2 and on cell2 prior to the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.34.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the start of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.35 3 DL PCell in FDD CA Activation and Deactivation of Known SCell in Non-DRX

### A.8.16.35.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.35.1-1 and cell-specific parameters in A.8.16.35.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 activation command in a subframe (m+10) during activation of the SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+29). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+9) and (m+15) to (m+19).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+9) and (n+15) to (n+19).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.35.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and SCell2 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.35.1-2: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | 17 | | |
| RSRP [Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |

| | | | | |
|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | μs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.35.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+29).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9) and outside the subframes (m+15) to (m+19).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9) and outside the subframes (n+15) to (n+19).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+29) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.36 3 DL PCell in TDD CA Activation and Deactivation of Known SCell in Non-DRX

### A.8.16.36.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.36.1-1 and cell-specific parameters in A.8.16.36.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 activation command in a subframe (m+15) during activation of the SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+29). The UE shall start reporting CSI for SCell1 in subframe

(m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11) and (n+20) to (n+26).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.36.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC1. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and SCell2 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.36.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |

| | | | | |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.36.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8,) or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+29).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11) and outside the subframes (n+20) to (n+26).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+29) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.37 3 DL FDD CA activation and deactivation of known SCell in non-DRX

## A.8.16.37.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 3DL FDD carrier aggregation, when the SCells are known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.37-1 and cell-specific parameters in A.8.16.37-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number,defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 activation command in a subframe (m+10) during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell1 at latest in asubframe (m+29). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+9ms) and (m+15) to (m+19).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+9) and (n+15) to (n+19).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.37-1: General test parameters for E-UTRAN FDD 3 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and SCell2 shall be known and the SCell1 configured and detected. |

| | | | |
|---|---|---|---|
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2. |

**Table A.8.16.37-2: Cell specific test parameters for E-UTRAN FDD 3 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | - | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.37.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+29).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9) and outside the subframes (m+15) to (m+19).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9) and outside the subframes (n+15) to (n+19).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+29) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.38 3 DL TDD CA activation and deactivation of known SCell in non-DRX

### A.8.16.38.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 3DL TDD carrier aggregation, when the SCells are known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.38-1 and cell-specific parameters in A.8.16.38-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 activation command in a subframe (m+15) during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell1 at latest in a subframe (m+29). The UE shall start reporting CSI for SCell1 for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE, in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11) and (n+20) to (n+26).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.38-1: General test parameters for E-UTRAN TDD 3 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |

| | | | |
|---|---|---|---|
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and SCell2 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2 |

**Table A.8.16.38-2: Cell specific test parameters for E-UTRAN TDD 3 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.38.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframe (m+8) and (m+9) were subject to interruption when an intra-band SCell is actitvated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+29).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframest (n+5) to (n+11) and outside the subframes (n+20) to (n+26).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+29) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.39 E-UTRA TDD-FDD 3DL CA Activation and Deactivation of Unknown SCell in Non-DRX with PCell in FDD

### A.8.16.39.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.39.1-1 and cell-specific parameters in A.8.16.39.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1 is FDD cell, and Cell 2 and Cell 3 are TDD cells. Cell 1 and Cell 3 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of the Cell 3 (SCell2) in subframe (m+10). Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+39) provided the SCell1 can be successfully detected on the first attempt. The

UE shall start reporting CSI for SCell1 in subframe (m+8), and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+9) and (m+15) to (m+19).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE, in a subframe # denoted n which is an even number, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) in subframe (n+10). The UE shall carry out deactivation of the Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in subframes (n+5) to (n+9) and (n+10) to (n+19).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.39.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell and SCell2 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.39.1-2: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| TDD special subframe configuration | | - | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | - | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: TDD special subframe configuration and uplink-downlink configuration are as specified in Table 4.2-1 and 4.2-2 in TS36.211 [16]. The same configuration applies to all TDD cells.

## A.8.16.39.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 at latest in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption . Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9) and outside the subframes (m+15) to (m+19).

During T3iInterruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9) and outside subframes (n+15) to (n+19).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.40 E-UTRA TDD-FDD 3DL CA Activation and Deactivation of Unknown SCell in Non-DRX with PCell in TDD

### A.8.16.40.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.40.1-1 and cell-specific parameters in A.8.16.40.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1 is TDD cell, and Cell 2 and Cell 3 are FDD cells. Cell 1 and Cell 3 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of the Cell 3 (SCell2) in subframe (m+15). Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+39) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI for SCell1 in subframe (m+8), and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in subframes (m+5) to (m+9) and (m+20) to (m+24).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) in subframe (n+15). The UE shall carry out deactivation of the Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in subframes (n+5) to (n+9) and (n+20) to (n+24).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.40.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |

| | | | |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell and SCell2 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.40.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| TDD special subframe configuration | | 6 | | | - | | | - | | |
| TDD uplink-downlink configuration | | 1 | | | - | | | - | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -infinity | 17 | | 17 | | |
| RSRP [Note 3] | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | |

| | | | | | |
|---|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: TDD special subframe configuration and uplink-downlink configuration are as specified in Table 4.2-1 and 4.2-2 in TS36.211 [16]. The same configuration applies to all TDD cells.

### A.8.16.40.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell12in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) and (m+9) and outside the subframes (m+20) to (m+24).

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9) and outside subframes (n+20) to (n+24).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.41 3 DL FDD CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.41.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 7.7 for 3DL FDD carrier aggregation, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.41-1 and cell-specific parameters in A.8.16.41-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1 and Cell 3 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2) in subframe (m+10). Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+39) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframe (m+5) to (m+9) and (m+15) to (m+19).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) in subframe (n+10). The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9) and (n+15) to (n+19).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.41-1: General test parameters for E-UTRAN FDD 3 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell1 | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell and SCell2 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.41-2: Cell specific test parameters for E-UTRAN FDD 3 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - | | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 | | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/ 15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/ 15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/ Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to Cell 2 Note 5 | µs | - | - | | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: The time alignment error (TAE) between two cells specified in TS36.104 [30] clause 6.5.3.1 (value depends upon the type of carrier aggregation).

### A.8.16.41.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9) and outside the subframes (m+15) to (m+19).

During T2 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9) and outside the subframes (n+15) to (n+19).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.42 3 DL TDD CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.42.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 7.7 for 3DL TDD carrier aggregation, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.42-1 and cell-specific parameters in A.8.16.42-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1 and cell 3 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on redio channel 3 (SCC2), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell 1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell 1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2) in subframe (m+15). Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+39) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) in subframe (n+15). The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11) and (n+20) to (n+26).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.42-1: General test parameters for E-UTRAN TDD 3 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell1 | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16]. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16]. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell and SCell2 shall be known and the SCell1 configured, |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2 |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.42-2: Cell specific test parameters for E-UTRAN TDD 3 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinit | 17 | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | -infinit | 17 | | 17 | | |
| RSRP Note 3 | dBm/ 15 kHz | -87 | | | -infinit | -87 | | -87 | | |
| SCH_RP Note 3 | dBm/ 15 kHz | -87 | | | -infinit | -87 | | -87 | | |
| Io Note 3 | dBm/ Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -76.22 +10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: The time alignment error (TAE) between two cells specified in TS 36.104 [30] clause 6.5.3.1 (value depends upon the type of carrier aggregation).

### A.8.16.42.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8)), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframes (m+8) and (m+9) were subject to interruption when an intra-band SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11) and outside the subframes (n+20) to (n+26).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.43 E-UTRAN TDD-FDD CA activation and deactivation of known SCell in non-DRX with PCell in FDD

### A.8.16.43.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.43.1-1 and cell-specific parameters in A.8.16.43.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+24). The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.43.1-1: General test parameters for known SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.43.1-2: Cell specific test parameters for E-UTRAN TDD known SCell activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | - | | | 6 | | |
| TDD uplink-downlink configuration | | - | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |

| | | | |
|---|---|---|---|
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.43.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+10) if the suframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than the values specified for inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.44 E-UTRAN TDD-FDD CA activation and deactivation of unknown SCell in non-DRX with PCell in FDD

### A.8.16.44.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.44.1-1 and cell-specific parameters in A.8.16.44.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Cell 1 has constant signal level throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 2 is increased to same level as for cell 1. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+34) provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.44.1-1: General test parameters for unknown SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell shall be known and the SCell configured, but not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.44.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | - | | | 6 | | |
| TDD uplink-downlink configuration | | - | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |

| | | | | |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -Infinity | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -Infinity | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -Infinity | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -Infinity | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | - | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.44.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than the values specified for inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation and deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.45 E-UTRAN TDD-FDD CA activation and deactivation of known SCell in non-DRX with PCell in TDD

### A.8.16.45.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.45.1-1 and cell-specific parameters in A.8.16.45.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+24). The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n where n is 4 or 9, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.45.1-1: General test parameters for known SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.45.1-2: Cell specific test parameters for E-UTRAN FDD known SCell activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | 6 | | | - | | |
| TDD uplink-downlink configuration | | 1 | | | - | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.45.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (m+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than the values specified for inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.46 E-UTRAN TDD-FDD CA activation and deactivation of unknown SCell in non-DRX with PCell in TDD

### A.8.16.46.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.46.1-1 and cell-specific parameters in A.8.16.46.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Cell 1 has constant signal level throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 2 is increased to same level as for cell 1. The UE shall be able to report valid CSI for the activated SCell at latest in subframe (m+34) provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.46.1-1: General test parameters for unknown SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |

| | | | |
|---|---|---|---|
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 100 | During this time the PCell shall be known and the SCell configured, but not detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.46.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | 6 | | | - | | |
| TDD uplink-downlink configuration | | 1 | | | - | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -Infinity | 17 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -Infinity | 17 | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -Infinity | -87 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -Infinity | -87 | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | |

| | | | |
|---|---|---|---|
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.46.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 Interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 Interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than the values specified for inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation and deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.47 2DL/2UL FDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX

### A.8.16.47.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 7.7 for 2DL/2UL FDD carrier aggregation, when PUCCH for a being activated SCell is configured on the SCell. The SCell is known by a UE and the UE does not have valid TA for an sTAG which the SCell belongs to at the time of activation.

Test parameters are given in Table A.8.16.47.1-1 and Table A.8.16.47.1-2. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. There are two carriers. In each carrier only one cell exists. All cells have constant signal levels throughout the test. The UE shall be continuously scheduled in Cell 1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on radio channel 1 (PCC), but is not aware of Cell 2 (SCell) on radio channel 2 (SCC). The PCell is in the pTAG and the SCell is in an sTAG. The UE is only monitoring the PCC.

At the beginning of T1, the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on radio channel 2 (SCC). The UE now starts monitoring the SCC also. Test equipment sends a MAC message for activation of the SCell.

The MAC message for the activation is received at the UE antenna connector at subframe # denoted m, which is defined as the start of time period T2. Subframe m is an even number. The test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at subframe (m+24). The UE shall be able to report valid CSI for the activated SCell no later than subframe (m+58). Any PCell interruption due to the activation shall not occur outside subframe (m+5) to (m+9).

A MAC message for deactivation of the SCell is received at the UE antenna connector at subframe # denoted n, which is defined as the start of time period T3. The UE shall carry out the deactivation of the SCell no later than subframe (n+8). Any PCell interruption due to the deactivation shall not occur outside subframe (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation and the deactivation, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received from the PUCCH SCell.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting fom the PUCCH SCell is discontinued.

**Table A.8.16.47.1-1: General test parameters for 2DL/2UL FDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for the test. |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell. |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe. |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | 1280 | Cell 2 in sTAG. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell shall be configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.47.1-2: Cell specific test parameters for 2DL/2UL FDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |

| | | | |
|---|---|---|---|
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE |
| PRACH Configuration index Note 6 | | - | 4 |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: As specified in table 5.7.1-2 in TS 36.211.

### A.8.16.47.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell with non-zero CQI index on the PUCCH SCell no later than subframe (m+58).

During T2 interruption of the PCell during the SCell activation shall not occur outside subframe (m+5) to (m+9).

During T3 the UE shall stop sending CSI reports from the PUCCH SCell no later than subframe (n+8).

During T3 interruption of the PCell during the SCell deactivation shall not occur outside subframe (n+5) to (n+9).

The interruption of the PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation and deactivation delay to be counted as correct.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in the subframe (m+58) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.48 2DL/2UL TDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX

### A.8.16.48.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 7.7 for 2DL/2UL TDD carrier aggregation, when PUCCH for a being activated SCell is configured on the SCell. The SCell is known by a UE and the UE does not have valid TA for a sTAG which the SCell belongs to at the time of activation.

Test parameters are given in Tables A.8.16.48.1-1 and cell-specific parameters in A.8.16.48.1-2. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. There are two carriers. In each carrier only one cell exists. All cells have constant signal levels throughout the test. The UE shall be continuously scheduled in Cell 1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on radio channel 1 (PCC), but is not aware of Cell 2 (SCell) on radio channel 2 (SCC). The PCell is in the pTAG and the SCell is in a sTAG. The UE is only monitoring the PCC.

At the beginning of T1, the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on radio channel 2 (SCC). The UE now starts monitoring the SCC also. A test equipment sends a MAC message for activation of the SCell.

The MAC message for the activation is received at the UE antenna connector at subframe # denoted m, which is defined as the start of time period T2. Subframe m is an even number. The test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at subframe (m+24). The UE shall be able to report valid CSI for the activated SCell no later than subframe (m+58). Any PCell interruption due to the activation shall not occur outside subframe (m+5) to (m+11).

A MAC message for deactivation of the SCell is received at the UE antenna connector at subframe # denoted n, which is defined as the start of time period T3. The UE shall carry out the deactivation of the SCell no later than subframe (n+8). Any PCell interruption due to the deactivation shall not occur outside subframe (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation and the deactivation, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received from the PUCCH SCell.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting fom the PUCCH SCell is discontinued.

**Table A.8.16.48.1-1: General test parameters for 2DL/2UL TDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for the test. |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16]. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 [16]. The same configuration applies to all cells |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe. |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | 1280 | Cell 2 in sTAG. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell shall be configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.48.1-2: Cell specific test parameters for 2DL/2UL TDD CA activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |

| | | | |
|---|---|---|---|
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE |
| PRACH Configuration index | | - | 4 |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.48.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell with non-zero CQI index on the PUCCH SCell no later than subframe (m+58).

During T2 interruption of the PCell during the SCell activation shall not occur outside subframe (m+5) to (m+11).

During T3 the UE shall stop sending CSI reports from the PUCCH SCell no later than subframe (n+8).

During T3 interruption of the PCell during the SCell deactivation shall not occur outside subframe (n+5) to (n+11).

The interruption of the PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation and deactivation delay to be counted as correct.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in the subframe (m+58) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.49 2DL/2UL TDD-FDD CA (FDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX

### A.8.16.49.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 7.7 for 2DL/2UL TDD-FDD carrier aggregation with PCell in FDD, when PUCCH for a being activated SCell is configured on the SCell. The SCell is known by a UE and the UE does not have valid TA for an sTAG which the SCell belongs to at the time of activation.

Test parameters are given in Table A.8.16.49.1-1 and Table A.8.16.49.1-2. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. There are two carriers. In each carrier only one cell exists. All cells have constant signal levels throughout the test. The UE shall be continuously scheduled in Cell 1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on radio channel 1 (PCC), but is not aware of Cell 2 (SCell) on radio channel 2 (SCC). The PCell is in the pTAG and the SCell is in an sTAG. The UE is only monitoring the PCC.

At the beginning of T1, the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on radio channel 2 (SCC). The UE now starts monitoring the SCC also. Test equipment sends a MAC message for activation of the SCell.

The MAC message for the activation is received at the UE antenna connector at subframe # denoted m, which is defined as the start of time period T2. Subframe m is an even number. The test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at subframe (m+24). The UE shall be able to report valid CSI for the activated SCell no later than subframe (m+58). Any PCell interruption due to the activation shall not occur outside subframe (m+5) to (m+9).

A MAC message for deactivation of the SCell is received at the UE antenna connector at subframe # denoted n, which is defined as the start of time period T3. The UE shall carry out the deactivation of the SCell no later than subframe (n+8). Any PCell interruption due to the deactivation shall not occur outside subframe (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during the activation and the deactivation, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received from the PUCCH SCell.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting fom the PUCCH SCell is discontinued.

**Table A.8.16.49.1-1: General test parameters for 2DL/2UL TDD-FDD CA (FDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| | | | |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | 1280 | Cell 2 in sTAG. |
| T1 | s | 7 | During this time the PCell and SCell shall be known. |

| | | | |
|---|---|---|---|
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.49.1-2: Cell specific test parameters for 2DL/2UL TDD-FDD CA (FDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | - | | | 6 | | |
| TDD uplink-downlink configuration | | - | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | |
| PRACH configuration Index Note 7 | | - | | | 4 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 6: | TDD special subframe configuration and uplink-downlink configuration are as specified in Table 4.2-1 and 4.2-2 in TS36.211 [16]. |
| Note 7: | As specified in table 5.7.1-2 in TS 36.211. |

### A.8.16.49.2 Test Requirements

During T2 the UE shall start sending CSI report for the SCell with non-zero CQI index on the PUCCH SCell no later than subframe (m+58).

During T2 interruption of the PCell during the SCell activation shall not occur outside subframe (m+5) to (m+9).

During T3 the UE shall stop sending CSI reports from the PUCCH SCell no later than subframe (n+8).

During T3 interruption of the PCell during the SCell deactivation shall not occur outside subframe (n+5) to (n+9).

The interruption of the PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in the subframe (m+58) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.50 2DL/2UL TDD-FDD CA (TDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX

### A.8.16.50.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation are done within the required time period defined in clause 7.7 for 2DL/2UL TDD-FDD carrier aggregation with PCell in TDD, when PUCCH for a being activated SCell is configured on the SCell. The SCell is known by a UE and the UE does not have valid TA for an sTAG which the SCell belongs to at the time of activation.

Test parameters are given in Tables A.8.16.50.1-1 and cell-specific parameters in A.8.16.50.1-2. The test consists of three successive time periods with duration of T1, T2 and T3, respectively. There are two carriers. In each carrier only one cell exists. All cells have constant signal levels throughout the test. The UE shall be continuously scheduled in Cell 1 (PCell) throughout the test.

Before the test starts, the UE is connected to the PCell (Cell 1) on radio channel 1 (PCC), but is not aware of Cell 2 (SCell) on radio channel 2 (SCC). The PCell is in the pTAG and the SCell is in an sTAG. The UE is only monitoring the PCC.

At the beginning of T1, the UE receives an RRC message by which the SCell (Cell 2) gets configured with PUCCH on radio channel 2 (SCC). The UE now starts monitoring the SCC also. The test equipment sends a MAC message for activation of the SCell.

The MAC message for the activation is received at the UE antenna connector at subframe # denoted m, which is defined as the start of time period T2. Subframe m is an even number. The test equipment should send a PDCCH order to the UE to initiate RA procedure on the PUCCH SCell at subframe (m+24). The UE shall be able to report valid CSI for the activated SCell no later than subframe (m+58). Any PCell interruption due to the activation shall not occur outside subframe (m+5) to (m+9).

A MAC message for deactivation of the SCell is received at the UE antenna connector at subframe # denoted n, which is defined as the start of time period T3. The UE shall carry out the deactivation of the SCell no later than subframe (n+8). Any PCell interruption due to the deactivation shall not occur outside subframe (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received from the PUCCH SCell.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting fom the PUCCH SCell is discontinued.

**Table A.8.16.50.1-1: General test parameters for 2DL/2UL TDD-FDD CA (TDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| TimeAlignmentTimer | ms | 1280 | Cell 1 in pTAG. |
| TimeAlignmentTimerSTAG | ms | 1280 | Cell 2 in sTAG. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.16.50.1-2: Cell specific test parameters for 2DL/2UL TDD-FDD CA (TDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| TDD special subframe configuration | | 6 | | | | | |
| TDD uplink-downlink configuration | | 1 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |

| | | | |
|---|---|---|---|
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE |
| PRACH Configuration index | | - | 4 |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: TDD special subframe configuration and uplink-downlink configuration are as specified in Table 4.2-1 and 4.2-2 in TS36.211 [16].

### A.8.16.50.2 Test Requirements

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index on the PUCCH SCell at latest in a subframe (m+58).

During T2 interruption of the PCell during the SCell activation shall not occur outside subframe (m+5) to (m+9).

During T3 the UE shall stop sending CSI reports from the PUCCH SCell no later than subframe (n+8).

During T3 interruption of the PCell during the SCell deactivation shall not occur outside subframe (n+5) to (n+9).

The interruption of the PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation and deactivation delay to be counted as correct.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in the subframe (m+58) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.51 E-UTRAN 4 DL FDD CA Event Triggered Reporting with 3 deactivated SCells in Non-DRX

### A.8.16.51.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

In this test case there are 5 cells. Cell 1 is the PCell on the FDD PCC F1. Cell 2 is the configured and deactivated SCell on the FDD SCC F2. Cell 3 is the configured and deactivated SCell on the FDD SCC F3. Cell 4 is the configured and deactivated SCell on the FDD SCC F4, and cell 5 is the neighbor cell on the FDD SCC F4.

The test parameters are given in Tables A.8.16.51.1-1 and A.8.16.51.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (cell2), A2 (PCell and SCells) and A6 are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 5. At the beginning of T2 the transmission power of cell 5 is increased to the same level as for cell 4, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4 and 5 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell3 and for Cell 4.

**Table A.8.16.51.1-1: General test parameters for E-UTRAN FDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbour cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1, cell3, cell4 shall be known to the UE; but cell2 and cell 5 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell5 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1, and 1.6s for cells 2, 3 and 4. |

**Table A.8.16.51.1-2: Cell specific test parameters for E-UTRAN FDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | | | | | | | | | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | | | | | | | | | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 KHz | -104 | | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}^{Note\ 3}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| $RSRP^{Note\ 3}$ | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| $SCH_RP^{Note\ 3}$ | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| $Io^{Note\ 3}$ | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 4 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | | 0 | | | 3 | | |
| Time alignment error relative to cell 1 $^{Note\ 5}$ | µs | - | | | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | | N/A | | |
| Time alignment error relative to cell 2 $^{Note\ 5}$ | µs | - | | | - | | | ≤ TAE | | | ≤ TAE | | | N/A | | |
| Time alignment error relative to cell 3 $^{Note\ 5}$ | µs | - | | | - | | | - | | | ≤ TAE | | | N/A | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.51.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 5 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.52 E-UTRAN 4 DL TDD CA Event Triggered Reporting with 3 deactivated SCells in Non-DRX

### A.8.16.52.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

In this test case there are 5 cells. Cell 1 is the PCell on the TDD PCC F1. Cell 2 is the configured and deactivated SCell on the TDD SCC F2. Cell 3 is the configured and deactivated SCell on the TDD SCC F3. Cell 4 is the configured and deactivated SCell on the TDD SCC F4, and cell 5 is the neighbor cell on the TDD SCC F4.

The test parameters are given in Tables A.8.16.52.1-1 and A.8.16.52.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (cell2), A2 (PCell and SCells) and A6 are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 5. At the beginning of T2 the transmission power of cell 5 is increased to the same level as for cell 4, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4 and 5 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell3 and for Cell 4.

**Table A.8.16.52.1-1: General test parameters for E-UTRAN TDD-TDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbour cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1 and cell3 shall be known to the UE; but cell2 and cell 5 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell5 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell 1, and 1.6s for cells 2, 3 and 4. |

**Table A.8.16.52.1-2: Cell specific test parameters for E-UTRAN TDD-TDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 4 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Timing offset to Cell 1 | µs | - | 0 | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.52.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 5 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.53 4 DL PCell in FDD CA Event Triggered Reporting with 3 Deactivated SCells in Non-DRX

### A.8.16.53.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.53.1-1, A.8.16.53.1-2 and A.8.16.53.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 5. At the beginning of T2 the transmission power of cell 5 is increased to the same level as for cell 4, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3 and for Cell 4.

**Table A.8.16.53.1-1: General test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | Cell 5 | Neighbour cell to be identified on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4 and cell5). |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4 and cell5). |
| A1 Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3 and cell4 |
| T1 | | s | 5 | During this time the cell1, cell3 and cell4 shall be known to the UE; but cell2 and cell5 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell5 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells2, 3 and 4. |

**Table A.8.16.53.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to cell1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2[Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | - | | |
| Time alignment error relative to cell 4[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.53.1-3: Cell specific test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 4 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note5 | µs | - | | | N/A | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | N/A | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | N/A | | |
| Time alignment error relative to cell 4 Note 5 | µs | - | | | N/A | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.53.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 5 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.54 4 DL PCell in TDD CA Event Triggered Reporting with 3 Deactivated SCells in Non-DRX

### A.8.16.54.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.54.1-1, A.8.16.54.1-2 and A.8.16.54.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 5. At the beginning of T2 the transmission power of cell 5 is increased to the same level as for cell 4, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3 and for Cell 4.

**Table A.8.16.54.1-1: General test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | Cell 5 | Neighbour cell to be identified on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The configuration applies to the TDD cell (cell1). |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The configuration applies to the TDD cell (cell1). |
| A1 Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3 and cell4 |
| T1 | | s | 5 | During this time the cell1, cell3 and cell4 shall be known to the UE; but cell2 and cell5 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell5 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells2, 3 and 4. |

**Table A.8.16.54.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to cell1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2[Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | - | | |
| Time alignment error relative to cell 4[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.54.1-3: Cell specific test parameters for E-UTRAN TDD-FDD 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 4 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to cell1 | µs | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note5 | µs | - | | | N/A | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | N/A | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | N/A | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | N/A | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.54.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 5 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.55 E-UTRAN FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.55.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.55.1-1, A.8.16.55.1-2 and A.8.16.55.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4 and Cell 5. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), Cell 3 is SCell on the FDD secondary component (RF Channel 3), Cell 4 is SCell on the FDD secondary component (RF Channel 4) and Cell 5 is the neighbour cell on the FDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3 and Cell4 are deactivated. During T1 the UE shall not have any information of Cell 5. Immediately at beginning of T2 the transmission power of Cell 5 is increased to same level as for Cell 4, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 5 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 and Cell4 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 5 is increased to same level as for Cell 4, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.55.1-1: General test parameters for E-UTRAN FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 5 | Neighbor cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3 and 4 but not cell 5. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.55.1-2: Cell specific test parameters for E-UTRAN FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.55.1-3: Cell specific test parameters for E-UTRAN FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #5)**

| Parameter | Unit | Cell 5 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.55.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.56 E-UTRAN TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.56.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.56.1-1, A.8.16.56.1-2 and A.8.16.56.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4and Cell 5. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), Cell 3 is SCell on the TDD secondary component (RF Channel 3), Cell 4 is SCell on the TDD secondary component (RF Channel 4) and Cell 5 is the neighbour cell on the TDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3 and Cell4 are deactivated. During T1 the UE shall not have any information of Cell 5. Immediately at beginning of T2 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 5 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 and Cell4 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.56.1-1: General test parameters for E-UTRAN TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 5 | Neighbor cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in all cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in all cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3 and 4 but not cell 5. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.56.1-2: Cell specific test parameters for E-UTRAN TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.56.1-3: Cell specific test parameters for E-UTRAN TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #5)**

| Parameter | Unit | Cell 5 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.56.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.57 E-UTRAN FDD 4DL CA activation and deactivation of know SCell in non-DRX

### A.8.16.57.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.57.1-1 and cell-specific parameters in A.8.16.57.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) and Cell4 (deactivated SCell3) on radio channel 4 (SCC3), but is not aware of Cell2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe #denoted m which is an even number, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 activation command in a subframe (m+10) and receives the SCell3 activation command in a subframe (m+20) during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell at latest in a subframe (m+34). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the subframe activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframe (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29).

Time period T3 starts when a MAC message for deactivation of SCell1, send from the test equipment to the UE in a subframe #denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) and send a MAC message for deactivation of the SCell3 in subframe (n+20). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any interruption due to the deactivation of SCells shall occur in the subframe (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.57.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.57.1-2: Cell specific test parameters for E-UTRAN FDD 4 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | μs | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | μs | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.57.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19) and outside the subframes (m+25) to (m+29).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19) and outside the subframes (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.58 E-UTRAN TDD 4DL CA activation and deactivation of know SCell in non-DRX

### A.8.16.58.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 4DL TDD carrier aggregation, when the SCells are known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.58-1 and cell-specific parameters in A.8.16.58-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. All cells have

constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) and Cell 4 (deactivated SCell3) on radio channel 4 (SCC3), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2 and SCell3 activation command in a subframe (m+15) during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell1 at latest in a subframe (m+34). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE, in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15) and for deactivation of the SCell3 in subframe (n+30). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.58-1: General test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.58-2: Cell specific test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | - | | | - | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.58.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframe (m+8) and (m+9) were subject to interruption when an intra-band

SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26) and outside the subframes (n+35) to (n+41).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.59 E-UTRAN PCell in FDD FDD-TDD 4 DL CA activation and deactivation of known SCell in non-DRX

### A.8.16.59.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.59.1-1 and cell-specific parameters in A.8.16.59.1-2 and A.8.16.59.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in a subframe (m+10) and a MAC message for activation of SCell3 in subframe (m+20) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+34). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) and a MAC message for deactivation of the SCell3 in subframe (n+20). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.59.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.59.1-2: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | - | | | 6 | | | 6 | | |
| Uplink-downlink configuration | | - | | | 1 | | | 1 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.59.1-3: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 4 | | | | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | | | | |
| Special subframe configuration | | 6 | | | | | | | | |
| Uplink-downlink configuration | | 1 | | | | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | | | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | | | | | |
| PBCH_RA | dB | 0 | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | μs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | |
| Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |
| Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. | | | | |
| Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. | | | | |

### A.8.16.59.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), and outside the subframes (m+25) to (m+29).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), and (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.60 E-UTRAN PCell in TDD FDD-TDD 4 DL CA activation and deactivation of known SCell in non-DRX

### A.8.16.60.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.60.1-1 and cell-specific parameters in A.8.16.60.1-2 and A.8.16.60.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio

channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE receives a MAC message for activation of SCell 2 and SCell3 in a subframe (m+15) during activation of the SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+34). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15) and a MAC message for deactivation of the SCell3 in subframe (n+30). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.60.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.60.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|

| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
|---|---|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | 6 | | | - | | | - | | |
| Uplink-downlink configuration | | 1 | | | - | | | - | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | - | | | - | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.60.1-3: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 4 | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | - | | |
| Uplink-downlink configuration | | - | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | μs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.60.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26) and outside the subframes (n+35) to (n+41).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.61 E-UTRAN FDD 4DL CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.61.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.61.1-1 and cell-specific parameters in A.8.16.61.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cell 1, Cell 3, and Cell 4 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) and Cell4 (deactivated SCell3) on radio channel 4 (SCC3), but is not aware of Cell2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2) and Cell4 (SCell 3) in subframe (m+10) and subframe (m+20), respectivity. Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+44) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) and Cell4 (SCell3) in subframe (n+10) and (n+20), respectivity. The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.61.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |

| | | | |
|---|---|---|---|
| Deconfigured SCell1 | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.61.1-2: Cell specific test parameters for E-UTRAN FDD 4 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | -infinity | 17 | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | | -87 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.61.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19) and outside the subframes (m+25) to (m+29).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19) and outside the subframes (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.62 E-UTRAN TDD 4DL CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.62.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 4DL TDD carrier aggregation, when the SCells are unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.62-1 and cell-specific parameters in A.8.16.62-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cell 1, Cell 3, and Cell 4 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) and Cell 4 (deactivated SCell3) on radio channel 4 (SCC3), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell 1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell 1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2) and Cell 4 (SCell3) in subframe (m+15) and subframe (m+30), respectivity. Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+44) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11), (m+20) to (m+26) and (m+35) to (m+41).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) and Cell 4 (SCell3) in subframe (n+15) and (n+30), respectivity. The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.62-1: General test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.62-2: Cell specific test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | -infinity | 17 | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -76.22 +10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | - | | | - | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.62.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframe (m+8) and (m+9) were subject to interruption when an intra-band

SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11), outside the subframes (m+20) to (m+26), and outside the subframes (n+35) to (n+41).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26) and outside the subframes (n+35) to (n+41).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.63 E-UTRAN PCell in FDD FDD-TDD 4 DL CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.63.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.63.1-1 and cell-specific parameters in A.8.16.63.1-2 and A.8.16.63.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cell 1, Cell 3 and Cell 4 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of the SCell2 in subframe (m+10) and a MAC message for activation of the SCell3 in subframe (m+20) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+44) provided SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) and a MAC message for deactivation of the SCell3 in subframe (n+20). The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.63.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.63.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | - | | | 6 | | | 6 | | |
| Uplink-downlink configuration | | - | | | 1 | | | 1 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.63.1-3: Cell specific test parameters for E-UTRAN TDD unknown SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 4 | | | | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | | | | |
| Special subframe configuration | | 6 | | | | | | | | |
| Uplink-downlink configuration | | 1 | | | | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | | | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | | | | | |
| PBCH_RA | dB | 0 | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | μs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.63.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), and outside the subframes (m+25) to (m+29).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), and (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.64 E-UTRAN PCell in TDD FDD-TDD 4 DL CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.64.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.64.1-1 and cell-specific parameters in A.8.16.64.1-2 and A.8.16.64.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cell 1, Cell 3 and Cell 4 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is 4 or 9. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in subframe (m+15) and a MAC message for activation of SCell3 in subframe (m+30) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+44) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+11), (m+20) to (m+26) and (m+35) to (m+41).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15) and a MAC message for deactivation of the SCell3 in subframe (n+30). The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.64.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |

| | | | |
|---|---|---|---|
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.64.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | 6 | | | - | | | - | | |
| Uplink-downlink configuration | | 1 | | | - | | | - | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | μs | - | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | μs | - | | | - | | | - | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.64.1-3: Cell specific test parameters for E-UTRAN FDD unknown SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 4 | | | | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | | | | |
| Special subframe configuration | | - | | | | | | | | |
| Uplink-downlink configuration | | - | | | | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | | | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | | | | | |
| PBCH_RA | dB | 0 | | | | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | | | | | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | | | | | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | | | | | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | | | | | | | |
| Propagation Condition | | AWGN | | | | | | | | |
| Antenna Configuration | | 1x2 | | | | | | | | |
| Timing offset to Cell 1 | µs | 0 | | | | | | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | | | | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | | | | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.64.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11), outside the subframes (m+20) to (m+26), and outside the subframes (m+35) to (m+41).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26) and outside the subframes (n+35) to (n+41).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.65 5 DL FDD-TDD with PCell in FDD CA Event Triggered Reporting with 4 Deactivated SCells in Non-DRX

### A.8.16.65.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.65.1-1, A.8.16.65.1-2 and A.8.16.65.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 6. At the beginning of T2 the transmission power of cell 6 is increased to the same level as for cell 5, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4 and 5 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3, for Cell 4 and for Cell 5.

**Table A.8.16.65.1-1: General test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | Cell 6 | Neighbour cell to be identified on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |
| A1 Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3, cell4 and cell5 |
| T1 | | s | 5 | During this time the cell1, cell3, cell4 and cell5 shall be known to the UE; but cell2 and cell6 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells 2, 3, 4 and 5. |

**Table A.8.16.65.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 [Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | - | | |
| Time alignment error relative to cell 4[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 5[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.65.1-3: Cell specific test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 5 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell5 Note 5 | µs | - | | | - | | | NA | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.16.65.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 6 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.66 5 DL FDD-TDD with PCell in TDD CA Event Triggered Reporting with 4 Deactivated SCells in Non-DRX

### A.8.16.66.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.66.1-1, Tables A.8.16.66.1-2 and A.8.16.66.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 6. At the beginning of T2 the transmission power of cell 6 is increased to the same level as for cell 5, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4 and 5 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3, for Cell 4 and for Cell 5.

**Table A.8.16.66.1-1: General test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbour cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The configuration applies to the TDD cell (cell1). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The configuration applies to the TDD cell (cell1). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3, cell4 and cell5 |
| T1 | | s | 5 | During this time the cell1, cell3, cell4 and cell5 shall be known to the UE; but cell2 and cell6 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells 2, 3, 4 and 5. |

**Table A.8.16.66.1-2: Cell specific test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 [Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | - | | |
| Time alignment error relative to cell 4[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 5[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.66.1-3: Cell specific test parameters for E-UTRAN TDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 5 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | - | | | NA | | |
| Time alignment error relative to cell5 Note 5 | µs | - | | | - | | | NA | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.16.66.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 6 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.67 5 DL FDD-TDD with PCell in FDD CA activation and deactivation of Unknown SCell in non-DRX

### A.8.16.67.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.67.1-1 and cell-specific parameters in A.8.16.67.1-2 and A.8.16.67.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. Cell 1, Cell 3, Cell 4 and Cell5 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in a subframe (m+10), a MAC message for activation of SCell3 in subframe (m+20), and a MAC message for activation of SCell4 in a subframe (m+30) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+49). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any

PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), and (m+35) to (m+39).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10), a MAC message for deactivation of the SCell3 in subframe (n+20), and a MAC message for deactivation of the SCell4 in subframe (n+30). The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), and (n+35) to (n+39).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.67.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.67.1-2: Cell specific test parameters for E-UTRAN TDD unknown SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |

| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
|---|---|---|---|---|---|
| Special subframe configuration | | - | 6 | | 6 |
| Uplink-downlink configuration | | - | 1 | | 1 |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - | | - |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.67.1-3: Cell specific test parameters for E-UTRAN TDD unknown SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| Special subframe configuration | | 6 | | | 6 | | | | | |
| Uplink-downlink configuration | | 1 | | | 1 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | | |
| PBCH_RA | dB | 0 | | | 0 | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | | | | |
| Propagation Condition | | AWGN | | | AWGN | | | | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 4 Note 5 | µs | - | | | ≤ TAE | | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.67.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), outside the subframes (m+25) to (m+29), and outside the subframes (m+35) to (m+39).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), outside the subframes (n+25) to (n+29), and outside the subframes (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.68 5 DL FDD-TDD with PCell in TDD CA activation and deactivation of Unknown SCell in non-DRX

### A.8.16.68.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.68.1-1 and cell-specific parameters in A.8.16.68.1-2 and A.8.16.68.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are fivecarriers, each with one cell. Cell 1, Cell 3, Cell 4 and Cell5 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is 4 or 9. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2, SCell3 and SCell4 in subframe (m+15) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+49). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15), a MAC message for deactivation of the SCell3 in subframe (n+30), and a MAC message for deactivation of the SCell4 in subframe (n+45). The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.68.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| | | | |
| | | | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.68.1-2: Cell specific test parameters for E-UTRAN FDD unknown SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | 6 | | | - | | | - | | |
| Uplink-downlink configuration | | 1 | | | - | | | - | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.68.1-3: Cell specific test parameters for E-UTRAN FDD unknown SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| Special subframe configuration | | - | | | - | | | | | |
| Uplink-downlink configuration | | - | | | - | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | 0 | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.68.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8,) or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26), outside the subframes (n+35) to (n+41), and outside the subframes (n+50) to (n+56).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.69 5 DL FDD CA activation and deactivation of unknown SCell in non-DRX

## A.8.16.69.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with five downlink SCells, when the SCell is unknown by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.69.1-1 and cell-specific parameters in A.8.16.69.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. Cell 1, Cell 3, Cell 4, and Cell 5 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), Cell4 (deactivated SCell3) on radio channel 4 (SCC3) and Cell5 (deactivated SCell4) on radio channel 5 (SCC4) but is not aware of Cell2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2), Cell4 (SCell 3) and Cell5 (SCell 4) in subframe (m+10), subframe (m+20) and subframe (m+30) respectivity. Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+49) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2), Cell4 (SCell3) and Cell5 (SCell4) in subframe (n+10), subframe (n+20), subframe (n+30), respectivity. The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.69.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4,5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell1 | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell3 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |

| | | | |
|---|---|---|---|
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.69.1-2: Cell specific test parameters for E-UTRAN FDD 5 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/ 15 kHz | -104 | | | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | | 17 | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | | | -infinity | | 17 | 17 | | | 17 | | | 17 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RSRP Note 3 | dBm/ 15 kHz | -87 | -infinity | -87 | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/ 15 kHz | -87 | -infinity | -87 | -87 | -87 | -87 |
| Io Note 3 | dBm/ Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.69.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), outside the subframes (m+25) to (m+29) and outside the subframes (m+35) to (m+39).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), outside the subframes (n+25) to (n+29) and outside the subframes (n+35) to (n+39).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.70 5 DL TDD CA activation and deactivation of unknown SCell in non-DRX

### A.8.16.70.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 5DL TDD carrier aggregation, when the SCells are unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.70.1-1 and cell-specific parameters in A.8.16.70.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. Cell 1, Cell 3, Cell 4, and Cell 5 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), Cell 4 (deactivated SCell3) on radio channel 4 (SCC3) and Cell 5 (deactivated SCell4) on radio channel 5 (SCC4), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell 1) becomes configured on radio channel 2 (SCC1). During T1 the signal level of Cell 2 (SCell 1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of the SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is 4 or 9. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of Cell 3 (SCell2), Cell 4 (SCell3) and Cell 5 (SCell4) in subframe (m+15). Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSIs for the activated SCell1 at latest in subframe (m+49) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2), Cell 4 (SCell3) and Cell 5 (SCell4) in subframe (n+15), (n+30) and (n+45), respectivity. The UE shall carry out deactivation of Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI reports with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.70.1-1: General test parameters for E-UTRAN TDD 5 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4,5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.70.1-2: Cell specific test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of unknown SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | | | | | | | | | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | | | | | | | | | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | | | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | - infinity | 17 | | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | - infinity | 17 | | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | - infinity | -87 | | -87 | | | -87 | | | -87 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/ 15 kHz | -87 | - infinity | -87 | -87 | -87 | -87 |
| Io Note 3 | dBm/ Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13+10log($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.70.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframe (m+8) and (m+9) were subject to interruption when an intra-band SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26), outside the subframes (n+35) to (n+41) and outside the subframes (n+50) to (n+56).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.71 5 DL FDD CA Event Triggered Reporting with Deactivated SCells in Non-DRX

## A.8.16.71.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

In this test case there are 6 cells. Cell 1 is the PCell on the FDD PCC F1. Cell 2 is the configured and deactivated SCell on the FDD SCC F2. Cell 3 is the configured and deactivated SCell on the FDD SCC F3. Cell 4 is the configured and deactivated SCell on the FDD SCC F4. Cell 5 is the configured and deactivated SCell on the FDD SCC F5, and cell 6 is the neighbor cell on the FDD SCC F5.

The test parameters are given in Tables A.8.16.71.1-1 and A.8.16.71.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (cell2), A2 (PCell and SCells) and A6 are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 6. At the beginning of T2 the transmission power of cell 6 is increased to the same level as for cell 5, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4, 5 and 6 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell3, for Cell 4 and for Cell 5.

**Table A.8.16.71.1-1: General test parameters for E-UTRAN FDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbour cell to be identified on RF channel number 6. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |

| | | | |
|---|---|---|---|
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 5 | During this time the cell1 cell3 cell4 cell5 shall be known to the UE; but cell2 and cell 6 shall be unknown to the UE. |
| T2 | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell6 within 6.4s (20×scellMeasCycle) |
| T3 | s | 5 | UE should report Event A2 within 200 ms for cell1, and 1.6s for cells 2, 3, 4 and 5. |

**Table A.8.16.71.1-2: Cell specific test parameters for E-UTRAN FDD-FDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | - | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$[Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.05 | -4.76 |
| RSRP[Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP[Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io[Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -76.22 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -56.17 +10log ($N_{RB,c}$/50) | -73.20 +10log ($N_{RB,c}$/50) | Specified in columns for Cell 5 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low |
| Timing offset to Cell 1 | µs | - | 0 | 0 | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.71.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 6 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.72 5 DL TDD CA Event Triggered Reporting with Deactivated SCells in Non-DRX

### A.8.16.72.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

In this test case there are 6 cells. Cell 1 is the PCell on the TDD PCC F1. Cell 2 is the configured and deactivated SCell on the TDD SCC F2. Cell 3 is the configured and deactivated SCell on the TDD SCC F3. Cell 4 is the configured and deactivated SCell on the TDD SCC F4.Cell 5 is the configured and deactivated SCell on the TDD SCC F5, and cell 6 is the neighbor cell on the TDD SCC F5.

The test parameters are given in Tables A.8.16.72.1-1 and A.8.16.72.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (cell2), A2 (PCell and SCells) and A6 are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 6. At the beginning of T2 the transmission power of cell 6 is increased to the same level as for cell 5, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4, 5 and 6 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell3, for Cell4 and for Cell 5.

**Table A.8.16.72.1-1: General test parameters for E-UTRAN TDD-TDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 6 | Neighbour cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset or cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1, cell3, cell 4, cell 5 shall be known to the UE; but cell2 and cell 6 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell 1, and 1.6s for cells 2, 3, 4, 5. |

**Table A.8.16.72.1-2: Cell specific test parameters for E-UTRAN TDD-TDD 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T2 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | | - | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | | 5MHz: OP.16 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.12 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$[Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP[Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP[Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io[Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -76.22 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -56.17 +10log ($N_{RB,c}$/50) | -73.20 +10log ($N_{RB,c}$/50) | Specified in columns for Cell 5 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | | ETU70 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low |
| Timing offset to Cell 1 | µs | - | 0 | 0 | 0 | 0 | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.72.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 6 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.73 5 DL FDD CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.73.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.73.1-1, A.8.16.73.1-2 and A.8.16.73.1-2 below. In the test there are six cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5 and Cell 6. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), Cell 3 is SCell on the FDD secondary component (RF Channel 3), Cell 4 is SCell on the FDD secondary component (RF Channel 4) and Cell 5 is SCell on the FDD secondary component (RF Channel 5) and Cell 6 is the neighbour cell on the FDD secondary component (RF Channel 5). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4 and Cell5 are deactivated. During T1 the UE shall not have any information of Cell 6. Immediately at beginning of T2 the transmission power of Cell 6 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 6 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3, Cell4 and Cell5 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 6 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.73.1-1: General test parameters for E-UTRAN FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbor cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4 and 5 but not cell 6. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.73.1-2: Cell specific test parameters for E-UTRAN FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |
| Time alignment error relative to cell 4 Note 5 | µs | - | | | | - | | | | - | | | | - | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.73.1-3: Cell specific test parameters for E-UTRAN FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #5 and Cell #6)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 5 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 4 Note 5 | μs | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
|---|---|

### A.8.16.73.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.74 5 DL TDD CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.74.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.74.1-1, A.8.16.74.1-2 and A.8.16.74.1-3 below. In the test there are six cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5 and Cell 6. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), Cell 3 is SCell on the TDD secondary component (RF Channel 3), Cell 4 is SCell on the TDD secondary component (RF Channel 4) and Cell 5 is SCell on the TDD secondary component (RF Channel 5) and Cell 6 is the neighbour cell on the TDD secondary component (RF Channel 5). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4 and Cell5 are deactivated. During T1 the UE shall not have any information of Cell 6. Immediately at beginning of T2 the transmission power of Cell 6 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 6 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3, Cell4 and Cell5 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 6 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.74.1-1: General test parameters for E-UTRAN TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbor cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in all cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in all cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4 and 5 but not cell 6. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.74.1-2: Cell specific test parameters for E-UTRAN TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #1, Cell #2, Cell #3 and Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |
| Time alignment error relative to cell 4 Note 5 | µs | - | | | | - | | | | - | | | | - | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.74.1-3: Cell specific test parameters for E-UTRAN TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell interruptions in Non-DRX (Cell #5 and Cell #6)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 5 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | - infinity | 16 | - infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | - infinity | -0.11 | - infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | - infinity | -85 | - infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | - infinity | -85 | - infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 4 Note 5 | µs | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
|---|---|

### A.8.16.74.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.75 5 DL FDD-TDD with PCell in FDD CA activation and deactivation of known SCell in non-DRX

### A.8.16.75.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.75.1-1 and cell-specific parameters in A.8.16.75.1-2 and A.8.16.75.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in a subframe (m+10), a MAC message for activation of SCell3 in subframe (m+20), and a MAC message for activation of SCell4 in a subframe (m+30) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+39). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), and (m+35) to (m+39).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10), a MAC message for deactivation of the SCell3 in subframe (n+20), and a MAC message for deactivation of the SCell4 in subframe (n+30). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), and (n+35) to (n+39).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.75.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.75.1-2: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | - | | | 6 | | | 6 | | |
| Uplink-downlink configuration | | - | | | 1 | | | 1 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | |

| | | | | |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.75.1-3: Cell specific test parameters for E-UTRAN TDD known SCell1 activation with PCell in FDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| Special subframe configuration | | 6 | | | 6 | | | | | |

| | | | | |
|---|---|---|---|---|
| Uplink-downlink configuration | | 1 | 1 | |
| PDSCH parameters: DL Reference Measurement Channel | | - | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | 0 | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.75.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), outside the subframes (m+25) to (m+29), and outside the subframes (m+35) to (m+39).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), outside the subframes (n+25) to (n+29), and outside the subframes (n+25) to (n+29).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.76 5 DL FDD-TDD with PCell in TDD CA activation and deactivation of known SCell in non-DRX

### A.8.16.76.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in TDD.

The test parameters are given in Tables A.8.16.76.1-1 and cell-specific parameters in A.8.16.76.1-2 and A.8.16.76.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are fivecarriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE receives a MAC message for activation of the SCell 2, SCell3 and SCell4 in a subframe (m+15) during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+39). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+11) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+15), a MAC message for deactivation of the SCell3 in subframe (n+30), and a MAC message for deactivation of the SCell4 in subframe (n+45). The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.76.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| | | | |
| | | | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.76.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration | | 6 | | | - | | | - | | |
| Uplink-downlink configuration | | 1 | | | - | | | - | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.76.1-3: Cell specific test parameters for E-UTRAN FDD known SCell1 activation with PCell in TDD**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| Special subframe configuration | | - | | | - | | | | | |
| Uplink-downlink configuration | | - | | | - | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | |

| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
|---|---|---|---|---|
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | 0 | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.76.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8,) or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+11) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26), outside the subframes (n+35) to (n+41), and outside the subframes (n+50) to (n+56).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.77 5 DL FDD CA activation and deactivation of know SCell in non-DRX

## A.8.16.77.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is known by the UE at the time of activation and PCell is in FDD.

The test parameters are given in Tables A.8.16.77.1-1 and cell-specific parameters in A.8.16.77.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), Cell4 (deactivated SCell3) on radio channel 4 (SCC3) and Cell5 (deactivated SCell4) on radio channel 5 (SCC4) but is not aware of Cell2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe #denoted m which is an even number, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the activation command for SCell2, SCell3 and SCell4 in subframes (m+10), (m+20) and (m+30) during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell at latest in a subframe (m+39). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the subframe activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframe (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39).

Time period T3 starts when a MAC message for deactivation of SCell1, send from the test equipment to the UE in a subframe #denoted n, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2, SCell3 and SCell4 in subframe (n+10), (n+20) and (n+30). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any interruption due to the deactivation of SCells shall occur in the subframe (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.77.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |

| | | | |
|---|---|---|---|
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell3 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.77.1-2: Cell specific test parameters for E-UTRAN FDD 5 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T3 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA Note 1 | dB | | | | | |
| OCNG_RB Note 1 | dB | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | -104 | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 | 17 | 17 |
| RSRP Note 3 | dBm/ 15 kHz | -87 | -87 | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/ 15 kHz | -87 | -87 | -87 | -87 | -87 |
| Io Note 3 | dBm/ Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.77.2 Test Requirements

During T2, the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+9), outside the subframes (m+15) to (m+19), outside the subframes (m+25) to (m+29) and outside the subframes (m+35) to (m+39).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+9), outside the subframes (n+15) to (n+19), outside the subframes (n+25) to (n+29) and outside the subframes (n+35) to (n+39).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.78 5 DL TDD CA activation and deactivation of know SCell in non-DRX

## A.8.16.78.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation times are within the requirements stated in clause 7.7 for 5DL TDD carrier aggregation, when the SCells are known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.78.1-1 and cell-specific parameters in A.8.16.78.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 3 (deactivated SCell2) on radio channel 3 (SCC2), Cell 4 (deactivated SCell3) on radio channel 4 (SCC3) and Cell 5 (deactivated SCell4) on radio channel 5 (SCC4), but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. At the beginning of T2 the test equipment sends a MAC message for activation of the SCell1. The UE receives the SCell2, SCell3 and SCell4 activation command in a subframe (m+15), during activation of the SCell1. The UE shall be able to report valid CSIs for the activated SCell1 at latest in a subframe (m+39). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in the subframes (m+5) to (m+12) and (m+20) to (m+26).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE, in a subframe # denoted n, where n is 4 or 9, is received at the UE antenna connector. The test equipment sends MAC message for deactivation of the SCell2 in subframe (n+15), MAC massage for deactivation of the SCell3 in subframe (n+30) and MAC massage for deactivation of the SCell3 in subframe (n+45). The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+12), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCells, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.78.1-1: General test parameters for E-UTRAN TDD 5 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3,4,5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured SCell | | Cell 2 | Deconfigured secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |

| | | | |
|---|---|---|---|
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.78.1-2: Cell specific test parameters for E-UTRAN TDD 4 DL CA activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | | Cell5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | | 17 | | | 17 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log($N_{RB,c}$ /50) | -59.13+10log($N_{RB,c}$ /50) | -59.13+10log($N_{RB,c}$ /50) | -59.13+10log($N_{RB,c}$ /50) | -59.13+10log($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.78.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframe (m+8) and (m+9) were subject to interruption when an intra-band SCell is activated. Whether CSI report in subframe (m+8) and/or (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) and/or (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside the subframes (m+5) to (m+12) and outside the subframes (m+20) to (m+26).

During T3 interruption of PCell during SCells deactivation shall not happen outside the subframes (n+5) to (n+11), outside the subframes (n+20) to (n+26), outside the subframes (n+35) to (n+41) and outside the subframes (n+50) to (n+56).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.79 E-UTRAN PCell in FDD FDD-TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

## A.8.16.79.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.79.1-1, A.8.16.79.1-2 and A.8.16.79.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4 and Cell 5. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), Cell 3 is SCell on the TDD secondary component (RF Channel 3), Cell 4 is SCell on the TDD secondary component (RF Channel 4) and Cell 5 is the neighbour cell on the TDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3 and Cell4 are deactivated. During T1 the UE shall not have any information of Cell 5. Immediately at beginning of T2 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 5 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 and Cell4 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.79.1-1: General test parameters for E-UTRAN PCell in FDD FDD-TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbor cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3 and 4 but not cell 5. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |

| | | | |
|---|---|---|---|
| T3 | s | 4 | During this time the UE shall activate cell 2 |
| T4 | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.79.1-2: Cell specific test parameters for E-UTRAN PCell in FDD FDD-TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.79.1-3: Cell specific test parameters for E-UTRAN PCell in FDD FDD-TDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #5)**

| Parameter | Unit | Cell 5 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
|---|---|

### A.8.16.79.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.80 E-UTRAN PCell in TDD TDD-FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.80.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.80.1-1, A.8.16.80.1-2 and A.8.16.80.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4and Cell 5. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), Cell 3 is SCell on the FDD secondary component (RF Channel 3), Cell 4 is SCell on the FDD secondary component (RF Channel 4) and Cell 5 is the neighbour cell on the FDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3 and Cell4 are deactivated. During T1 the UE shall not have any information of Cell 5. Immediately at beginning of T2 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 5 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 and Cell4 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.80.1-1: General test parameters for E-UTRAN PCell in TDD TDD-FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbor cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in all cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in all cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3 and 4 but not cell 5. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.80.1-2: Cell specific test parameters for E-UTRAN PCell in TDD TDD-FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.80.1-3: Cell specific test parameters for E-UTRAN PCell in TDD TDD-FDD 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #5)**

| Parameter | Unit | Cell 5 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
|---|---|

### A.8.16.80.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.81 E-UTRAN PCell in FDD FDD-TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.81.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.81.1-1, A.8.16.81.1-2 and A.8.16.81.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5 and Cell 6. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is SCell on the TDD secondary component (RF Channel 2), Cell 3 is SCell on the TDD secondary component (RF Channel 3), Cell 4 is SCell on the TDD secondary component (RF Channel 4), Cell 5 is SCell on the TDD secondary component (RF Channel 5) and Cell 6 is the neighbour cell on the TDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4 and Cell5 are deactivated. During T1 the UE shall not have any information of Cell 6. Immediately at beginning of T2 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 6 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell 3, Cell 4 and Cell5 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.81.1-1: General test parameters for E-UTRAN PCell in FDD FDD-TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbor cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4 and 5 but not cell 6. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.81.1-2: Cell specific test parameters for E-UTRAN PCell in FDD FDD-TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | | N/A | N/A | N/A | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.81.1-3: Cell specific test parameters for E-UTRAN PCell in FDD FDD-TDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #5, Cell #6)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 5 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.81.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.82 E-UTRAN PCell in TDD TDD-FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX

### A.8.16.82.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.82.1-1, A.8.16.82.1-2 and A.8.16.82.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5 and Cell 6. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is SCell on the FDD secondary component (RF Channel 2), Cell 3 is SCell on the FDD secondary component (RF Channel 3), Cell 4 is SCell on the FDD secondary component (RF Channel 4), Cell 5 is SCell on the FDD secondary component (RF Channel 5) and Cell 6 is the neighbour cell on the FDD secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4 and Cell5 are deactivated. During T1 the UE shall not have any information of Cell 6. Immediately at beginning of T2 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 6 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3, Cell4 and Cell5 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.82.1-1: General test parameters for E-UTRAN PCell in TDD TDD-FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |

| | | | | |
|---|---|---|---|---|
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbor cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in all cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in all cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4 and 5 but not cell 6. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.82.1-2: Cell specific test parameters for E-UTRAN PCell in TDD TDD-FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 3 Note 5 | µs | - | | | | - | | | | - | | | | ≤ TAE | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.82.1-3: Cell specific test parameters for E-UTRAN PCell in TDD TDD-FDD 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX (Cell #5, Cell #6)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 5 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.82.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.83 3 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX with generic duplex modes

### A.8.16.83.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.27, A.8.16.28, A.8.16.29 and A.8.16.30 does not need to be tested in the generic duplex-mode test case A.8.16.83.

The test parameters are given in Tables A.8.16.83.1-1 and A.8.16.83.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 4. At the beginning of T2 the transmission power of cell 4 is increased to the same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2 and for Cell 3. Cells 1, 2, 3 and 4 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.83.1-1: General test parameters for E-UTRAN generic duplex mode 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Neighbour cell | | | Cell 4 | Neighbour cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3 and cell4 may be configured for FDD or TDD operation). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3 and cell4 may be configured for FDD or TDD operation). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | During this time the cell1 and cell3 shall be known to the UE; but cell2 and cell 4 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell4 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms. 1.6s, and 1.6s for cells 1, 2 and 3, respectively. |

**Table A.8.16.83.1-2: Cell specific test parameters for E-UTRAN generic duplex modes 3 DL CA event triggered reporting under fading propagation conditions with 2 configured but deactivated SCells in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | | Cell 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | | | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD | | | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD | | | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | | |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 | | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | | 3 | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | ≤ TAE | | | N/A | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | - | | | ≤ TAE | | | N/A | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.83.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 4 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.84 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes

### A.8.16.84.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.31, A.8.16.32, A.8.16.33 and A.8.16.34 does not need to be tested in the generic duplex-mode test case A.8.16.84.

The test parameters are given in Table A.8.16.84.1-1 and A.8.16.84.1-2 below. In the test there are four cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the primary component (RF Channel 1), Cell 2 is SCell on the secondary component (RF Channel 2), and Cell 3 is SCell on the secondary component (RF Channel 3) and Cell 4 is the neighbour cell on the secondary component (RF Channel 3). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, both Cell2 and Cell3 are deactivated. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 4 is turned off and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 remains deactivated. Immediately at beginning of T4 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell 2 during T4. Cells 1, 2, 3 and 4 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.84.1-1: General test parameters for E-UTRAN 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX and with PCell with generic duplex modes**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3 and cell4 may be configured for FDD or TDD operation). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3 and cell4 may be configured for FDD or TDD operation). |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.84.1-2: Cell specific test parameters for E-UTRAN 3 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 3 | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/ PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 and A.3.2.2 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP. 7 TDD | | | | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : | 5MHz: OP.19 FDD; 10MHz :OP.6 FDD; 20MHz : | 5MHz: OP.20 FDD; 10MHz :OP.10 FDD; 20MHz : | 5MHz: OP.16FDD; 10MHz:OP.2 FDD; 20MHz: OP.12FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16FDD; 10MHz:OP.2 FDD; 20MHz: OP.12FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |

| | | | | | | OP.14 FDD 5MHz: OP.10 TDD 10MHz : OP.2 TDD 20MHz : OP.8 TDD | OP.14 FDD 5MHz: OP.10 TDD 10MHz : OP.2 TDD 20MHz : OP.8 TDD | OP.14 FDD 5MHz: OP.10 TDD 10MHz : OP.2 TDD 20MHz : OP.8 TDD | OP.17 FDD 5MHz: OP.9 TDD 10MHz : OP.1 TDD 20MHz : OP.7 TDD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -Infinity | 16 | -Infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | -Infinity | -0.11 | -Infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 | -Infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | - | | | | 0 | | | | 0 | | | | 3 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE | N/A |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 prior to the start of time period T2 and on cell2 prior to the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.84.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the start of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.85 3 DL CA Activation and Deactivation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.85.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is known by the UE at the time of activation.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.35, A.8.16.36, A.8.16.37, A.8.16.38, does not need to be tested in the generic duplex-mode test case A.8.16.85.

The test parameters are given in Tables A.8.16.85.1-1 and cell-specific parameters in A.8.16.85.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1, Cell 2 and Cell 3 may operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell, defines the start of time period T2. The UE receives the SCell2 activation command in the subframe (m+10) for FDD PCell and (m+15) for TDD PCell during activation of the SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+29). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in subframes (m+5) to (m+9) and (m+15) to (m+19) for FDD PCell and (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell. The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in the subframes (n+5) to (n+9) and (n+15) to (n+19) for FDD PCell and (n+5) to (n+11) and (n+20) to (n+26) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.85.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC1. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and SCell2 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.85.1-2: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |

| | | | | |
|---|---|---|---|---|
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | μs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.85.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in subframe (m+8), or in subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+9) and (m+8) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+29).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+11) and (m+15) to (m+19) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+11) and (n+15) to (n+19) for FDD PCell, and not happen outside subframes (n+5) to (n+11) and (n+20) to (n+26) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+29) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.86 3 DL CA Activation and Deactivation of Unknown SCell in Non-DRX with generic duplex modes

### A.8.16.86.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with two downlink SCells, when the SCell is unknown by the UE at the time of activation.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.39, A.8.16.40, A.8.16.41, A.8.16.42, does not need to be tested in the generic duplex-mode test case A.8.16.86.

The test parameters are given in Tables A.8.16.86.1-1 and cell-specific parameters in A.8.16.86.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. Cell 1, Cell 2 and Cell 3 may operate in either FDD or TDD duplex mode according to test configuration. Cell 1 and Cell 3 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 3 (deactivated SCell2) on radio channel 3 (SCC2) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC and SCC2. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the Cell 2 (SCell1) becomes configured on radio channel 2 (SCC1). During T1 Cell 2 (SCell1) is powered off and UE is not aware of Cell 2 (SCell1).

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell. The point in time at which the MAC message for activation of Cell 2 (SCell1) is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 (SCell1) is increased to same level as for Cell 1 (PCell). The test equipment sends a MAC message for activation of the Cell 3 (SCell2) in subframe (m+10) for FDD PCell and (m+15) for TDD PCell. Since UE received SCell2 activation command during activation of SCell1, the UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+39) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI for SCell1 in subframe (m+8), and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall occur in subframes (m+5) to (m+9) and (m+15) to (m+19) for FDD PCell, and (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of Cell 2 (SCell1), sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the Cell 3 (SCell2) in subframe (n+10) for FDD PCell and (n+15) for TDD PCell. The UE shall carry out deactivation of the Cell 2 (SCell1) at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall occur in subframes (n+5) to (n+9) and (n+15) to (n+19) for FDD PCell, and (n+5) to (n+11) and (n+20) to (n+26) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the Cell 2 (SCell1) activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the Cell 2 (SCell1) deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.86.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell1 | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell and SCell2 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1 and SCell2. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1 and SCell2. |
| Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.16.86.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | | | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | | | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: TDD special subframe configuration and uplink-downlink configuration are as specified in Table 4.2-1 and 4.2-2 in TS36.211 [16]. The same configuration applies to all TDD cells.

### A.8.16.86.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell12 in a subframe (m+8), or in subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9) and (m+15) to (m+19) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9) and (n+15) to (n+19) for FDD PCell, and not happen outside subframes (n+5) to (n+11) and (n+20) to (n+26) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.87 4 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX with generic duplex modes

### A.8.16.87.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.51, A.8.16.52, A.8.16.53 and A.8.16.54 does not need to be tested in the generic duplex-mode test case A.8.16.87.

The test parameters are given in Tables A.8.16.87.1-1, A.8.16.87.1-2 and A.8.16.87.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 5. At the beginning of T2 the transmission power of cell 5 is increased to the same level as for cell 4, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3 and 4 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3 and for Cell 4. Cells 1, 2, 3, 4 and 5 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.87.1-1: General test parameters for E-UTRAN 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbour cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3, cell4 and cell5 may be configured for FDD or TDD operation). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3, cell 4 and cell5 may be configured for FDD or TDD operation). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3 and cell4 |
| T1 | | s | 5 | During this time the cell1, cell3 and cell4 shall be known to the UE; but cell2 and cell5 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell5 within 6.4s (20×scellMeasCycle) |

| | | | |
|---|---|---|---|
| T3 | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells2, 3 and 4. |

**Table A.8.16.87.1-2: Cell specific test parameters for E-UTRAN 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to cell1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2[Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |
| Time alignment error relative to cell 3[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | - | | |
| Time alignment error relative to cell 4[Note 5] | μs | ≤ TAE | | | ≤ TAE | | | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.87.1-3: Cell specific test parameters for E-UTRAN 4 DL CA event triggered reporting under fading propagation conditions with 3 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 4 | | | Cell 5 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 4 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note5 | µs | - | | | N/A | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | N/A | | |

| | | | |
|---|---|---|---|
| Time alignment error relative to cell 3[Note 5] | µs | - | N/A |
| Time alignment error relative to cell 4[Note 5] | µs | - | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.87.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 5 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.88 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes

### A.8.16.88.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.55, A.8.16.56, A.8.16.79 and A.8.16.80 does not need to be tested in the generic duplex-mode test case A.8.16.88.

The test parameters are given in Table A.8.16.88.1-1, A.8.16.88.1-2 and A.8.16.88.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4 and Cell 5. Cell 1 is PCell on the primary component (RF Channel 1), Cell 2 is SCell on the secondary component (RF Channel 2), Cell 3 is SCell on the secondary component (RF Channel 3), Cell 4 is SCell on the secondary component (RF Channel 4) and Cell 5 is the neighbour cell on the secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3 and Cell4 are deactivated. During T1 the UE shall not have any information of Cell 5. Immediately at beginning of T2 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6.

At the beginning of T3, the transmission power of Cell 5 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell3 and Cell4 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 5 is increased to same level as for Cell 3, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4. Cells 1, 2, 3, 4 and 5 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.88.1-1: General test parameters for E-UTRAN 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |

| | | | | |
|---|---|---|---|---|
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Neighbour cell | | | Cell 5 | Neighbor cell to be identified on RF channel number 4. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3, cell4 and cell5 may be configured for FDD or TDD operation). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to any TDD cells (cell1, cell2, cell3, cell 4 and cell5 may be configured for FDD or TDD operation). |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3 and 4 but not cell 5. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.88.1-2: Cell specific test parameters for E-UTRAN 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | | | | | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 | |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 | |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.88.1-3: Cell specific test parameters for E-UTRAN 4 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes(Cell #5)**

| Parameter | Unit | Cell 5 | | | |
|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | N/A | | | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Void | | | | | |

| | |
|---|---|
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.16.88.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.89 4 DL CA Activation and Deactivation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.89.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is known by the UE at the time of activation.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.57, A.8.16.58, A.8.16.59, A.8.16.60, does not need to be tested in the generic duplex-mode test case A.8.16.89.

The test parameters are given in Tables A.8.16.89.1-1 and cell-specific parameters in A.8.16.89.1-2 and A.8.16.89.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell and a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell during activation of the SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+34). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29) for FDD PCell, and not outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell and a MAC message for deactivation of SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell. The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.89.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.89.1-2: Cell specific test parameters for E-UTRAN FDD known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD Special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD Uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | | |
|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | - |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.89.1-3: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |

| | | | | |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | | |
| Duplex mode | | FDD or TDD | | |
| TDD Special subframe configuration | | 6 | | |
| TDD Uplink-downlink configuration | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | µs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.89.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in subframe (m+8), or in subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.90 4 DL CA Activation and Deactivation of Unknown SCell in Non-DRX with generic duplex modes

### A.8.16.90.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with three downlink SCells, when the SCell is unknown by the UE at the time of activation.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.61, A.8.16.62, A.8.16.63, A.8.16.64, does not need to be tested in the generic duplex-mode test case A.8.16.90.

The test parameters are given in Tables A.8.16.90.1-1 and cell-specific parameters in A.8.16.90.1-2 and A.8.16.90.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are four carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. Cell 1, Cell 3 and Cell 4 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2) and deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2 and SCC3. The UE shall be continuously scheduled in PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, and a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+30) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in subframe (m+44) provided the SCell1 can be successfully detected on the first attempt. The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29) for FDD PCell, and not outside subframes (m+5) to (m+11), (m+20) to (m+26) and (m+35) to (m+41) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, and a MAC message for deactivation of the SCell3 in subframe (n+20) in FDD PCell and (n+30) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur

outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.90.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4 | Four radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2 and SCell3 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, and SCell3. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, and SCell3. |

**Table A.8.16.90.1-2: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD Special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD Uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -76.22<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.90.1-3: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 4 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 4 | | | | | | | | |
| Duplex mode | | FDD or TDD | | | | | | | | |
| TDD Special subframe configuration | | 6 | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| TDD Uplink-downlink configuration | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | µs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.90.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes

(m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19) and (m+25) to (m+29) for FDD PCell, and not happen outside subframes (m+5) to (m+11), (m+20) to (m+26) and (m+35) to (m+41) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19) and (n+25) to (n+29) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26) and (n+35) to (n+41) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.91 5 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX with generic duplex modes

## A.8.16.91.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.71, A.8.16.72, A.8.65 and A.8.16.66 does not need to be tested in the generic duplex-mode test case A.8.16.91.

The test parameters are given in Tables A.8.16.91.1-1, A.8.16.91.1-2 and A.8.16.91.1-3 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 6. At the beginning of T2 the transmission power of cell 6 is increased to the same level as for cell 5, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4 and 5 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3, for Cell 4 and for Cell 5. Cells 1, 2, 3, 4, 5 and 6 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.91.1-1: General test parameters for E-UTRAN 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | Cell 6 | Neighbour cell to be identified on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |

| | | | | |
|---|---|---|---|---|
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3, cell4 and cell5 |
| T1 | | s | 5 | During this time the cell1, cell3, cell4 and cell5 shall be known to the UE; but cell2 and cell6 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell6 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells 2, 3, 4 and 5. |

**Table A.8.16.91.1-2: Cell specific test parameters for E-UTRAN 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 [Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 3[Note 5] | µs | ≤ TAE | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.91.1-3: Cell specific test parameters for E-UTRAN 5 DL CA event triggered reporting under fading propagation conditions with 4 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -infinity | -87 | -107 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 5 |
| Propagation Condition | | ETU70 | | | ETU70 | | | ETU70 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | 3 |
| Time alignment error relative to cell1 Note 5 | µs | - | | | - | | | NA |
| Time alignment error relative to cell2 Note 5 | µs | - | | | - | | | NA |
| Time alignment error relative to cell3 Note 5 | µs | - | | | - | | | NA |
| Time alignment error relative to cell4 Note 5 | µs | - | | | - | | | NA |
| Time alignment error relative to cell5 Note 5 | µs | - | | | - | | | NA |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.91.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 6 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.16.92 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes

## A.8.16.92.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.73, A.8.16.74, A.8.16.81 and A.8.16.82 does not need to be tested in the generic duplex-mode test case A.8.16.92.

The test parameters are given in Table A.8.16.92.1-1, A.8.16.92.1-2 and A.8.16.92.1-3 below. In the test there are five cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5 and Cell 6. Cell 1 is PCell on the primary component (RF Channel 1), Cell 2 is SCell on the secondary component (RF Channel 2), Cell 3 is SCell on the secondary component (RF Channel 3), Cell 4 is SCell on the secondary component (RF Channel 4), Cell 5 is SCell on the secondary component (RF Channel 5) and Cell 6 is the neighbour cell on the secondary component (RF Channel 4). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4 and Cell5 are deactivated. During T1 the UE shall not have any information of Cell 6. Immediately at beginning of T2 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6. Cells 1, 2, 3, 4, 5 and 6 may operate in either FDD or TDD duplex mode according to test configuration.

At the beginning of T3, the transmission power of Cell 6 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell 3, Cell 4 and Cell5 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 6 is increased to same level as for Cell 5, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.92.1-1: General test parameters for E-UTRAN 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4, 5 | Four radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Neighbour cell | | | Cell 6 | Neighbor cell to be identified on RF channel number 5. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5 and cell6). |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle | ms | 640 | |
| T1 | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4 and 5 but not cell 6. |
| T2 | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | s | 4 | During this time the UE shall activate cell 2 |
| T4 | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.92.1-2: Cell specific test parameters for E-UTRAN 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.19 FDD<br>10MHz: OP.6 FDD<br>20MHz: OP.14 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |

| | | | | | | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.92.1-3: Cell specific test parameters for E-UTRAN 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #5, Cell #6)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 5 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 4: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.16.92.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.93 5 DL CA Activation and Deactivation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.93.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is known by the UE at the time of activation .

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.75, A.8.16.76, A.8.16.77, A.8.16.78, does not need to be tested in the generic duplex-mode test case A.8.16.93.

The test parameters are given in Tables A.8.16.93.1-1 and cell-specific parameters in A.8.16.93.1-2 and A.8.16.93.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are fivecarriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell, and a MAC message for activation of SCell4 in subframe (m+30) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+39). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39) for FDD PCell, and not outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, and a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell. The UE shall carry out deactivation

of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.93.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.93.1-2: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD Special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD Uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | | |
|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | - |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.76.1-3: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | | | |
| TDD Special subframe configuration | | 6 | | | 6 | | | | | |
| TDD Uplink-downlink configuration | | 1 | | | 1 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | | |
| PBCH_RA | dB | 0 | | | 0 | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | | | | |
| Propagation Condition | | AWGN | | | AWGN | | | | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | | ≤ TAE | | | | | |
| Time alignment error relative to cell 4 Note 5 | µs | - | | | ≤ TAE | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.16.93.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+39).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+39) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.94 5 DL CA Activation and Deactivation of Unknown SCell in Non-DRX with generic duplex modes

### A.8.16.94.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with four downlink SCells, when the SCell is unknown by the UE at the time of activation.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.8.16.67, A.8.16.68, A.8.16.69, A.8.16.70, does not need to be tested in the generic duplex-mode test case A.8.16.94.

The test parameters are given in Tables A.8.16.94.1-1 and cell-specific parameters in A.8.16.94.1-2 and A.8.16.94.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are five carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. Cell 1, Cell 3, Cell 4 and Cell5 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3) and deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 and SCC4. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for

FDD PCell and (m+15) for TDD PCell, and a MAC message for activation of SCell4 in a subframe (m+30) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+49). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39) for FDD PCell, and not outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, and a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.94.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5 | Five radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3 and SCell4 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3 and SCell4. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3 and SCell4. |

**Table A.8.16.94.1-2: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD |
| TDD Special subframe configuration | | 6 | 6 | | 6 |
| TDD Uplink-downlink configuration | | 1 | 1 | | 1 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | | - |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | -infinity | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | -infinity | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/ChBW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.94.1-3: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | | | |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | | | |
| TDD Special subframe configuration | | 6 | | | 6 | | | | | |
| TDD Uplink-downlink configuration | | 1 | | | 1 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | | |
| PBCH_RA | dB | 0 | | | 0 | | | | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | | | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | | | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | | | -104 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | | | |

| | | | | |
|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | 0 | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.94.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29) and (m+35) to (m+39) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29) and (n+35) to (n+39) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41) and (n+50) to (n+56) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.95 6 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX with generic duplex modes

### A.8.16.95.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.95.1-1, A.8.16.95.1-2, A.8.16.95.1-3 and A.8.16.95.1-4 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 7. At the beginning of T2 the transmission power of cell 7 is increased to the same level as for cell 6, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the

transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4, 5 and 6 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3, for Cell 4, for Cell 5 and Cell 6. Cells 1, 2, 3, 4, 5, 6 and 7 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.95.1-1: General test parameters for E-UTRAN 6 DL CA event triggered reporting under fading propagation conditions with 5 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4, 5, 6 | Six radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell | | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Neighbour cell | | | Cell 7 | Neighbour cell to be identified on RF channel number 6. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| TDD special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6 and cell 7). |
| TDD uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6 and cell 7). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 6 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3, cell4, cell5 and cell6 |
| T1 | | s | 5 | During this time the cell1, cell3, cell4, cell5 and cell6 shall be known to the UE; but cell2 and cell7 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell7 within 6.4s (20×scellMeasCycle) |

| | | | |
|---|---|---|---|
| T3 | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells 2, 3, 4, 5 and 6. |

**Table A.8.16.95.1-2: Cell specific test parameters for E-UTRAN 6 DL CA event triggered reporting under fading propagation conditions with 5 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -76.22 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -59.13 +10log ($N_{RB,c}$/50) | -74.45 +10log ($N_{RB,c}$/50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | µs | - | | | ≤ TAE | | | ≤ TAE | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 2[Note 5] | µs | ≤ TAE | - | ≤ TAE |
| Time alignment error relative to cell 3[Note 5] | µs | ≤ TAE | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 6[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.95.1-3: Cell specific test parameters for E-UTRAN 6 DL CA event triggered reporting under fading propagation conditions with 5 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | 17 | 17 | -3 | 17 | -0.09 | -4.76 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | 0 | | |
| Time alignment error relative to cell1 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell5 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell6 Note 5 | µs | - | | | - | | | - | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.95.1-4: Cell specific test parameters for E-UTRAN 6 DL CA event triggered reporting under fading propagation conditions with 5 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 7 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 6 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | - | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |

| | | | | |
|---|---|---|---|---|
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | Specified in columns for Cell 6 | | |
| Propagation Condition | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 3 | | |
| Time alignment error relative to cell1 Note 5 | µs | NA | | |
| Time alignment error relative to cell2 Note 5 | µs | NA | | |
| Time alignment error relative to cell3 Note 5 | µs | NA | | |
| Time alignment error relative to cell4 Note 5 | µs | NA | | |
| Time alignment error relative to cell5 Note 5 | µs | NA | | |
| Time alignment error relative to cell6 Note 5 | µs | NA | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.95.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 7 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 6 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.96 6 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes

### A.8.16.96.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.96.1-1, A.8.16.96.1-2 and A.8.16.96.1-3 below. In the test there are seven cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5, Cell 6 and Cell 7. Cell 1 is PCell on the primary component (RF Channel 1), Cell 2 is SCell on the secondary component (RF Channel 2), Cell 3 is SCell on the secondary component (RF Channel 3), Cell 4 is SCell on the secondary component (RF Channel 4), Cell 5 is SCell on the secondary component (RF Channel 5), Cell 6 is SCell on the secondary component (RF Channel 6) and Cell 7 is the neighbour cell on the secondary component (RF Channel 6). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4, Cell5 and Cell6 are deactivated. During T1 the UE shall not have any information of Cell 7. Immediately at beginning of T2 the transmission power of Cell 7 is increased to same level as for Cell 6, and due to usage of an offset this shall result in reporting of Event A6. Cells 1, 2, 3, 4, 5, 6 and 7 may operate in either FDD or TDD duplex mode according to test configuration.

At the beginning of T3, the transmission power of Cell 7 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell 3, Cell 4, Cell5 and Cell6 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 7 is increased to same level as for Cell 6, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.96.1-1: General test parameters for E-UTRAN 6 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6 | Six radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Neighbour cell | | Cell 7 | Neighbor cell to be identified on RF channel number 6. |
| CP length | | Normal | |
| TDD special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6 and cell7). |
| TDD uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6 and cell7). |
| DRX | | OFF | Continuous monitoring of primary cell |

| | | | | |
|---|---|---|---|---|
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 6 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4, 5, and 6 but not cell 7. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.96.1-2: Cell specific test parameters for E-UTRAN 6 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |

| | | | | | | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.96.1-3: Cell specific test parameters for E-UTRAN 6 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #5, Cell #6, Cell #7)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | | Cell 7 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 6 | | | | 6 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.96.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.97 6 DL CA Activation and Deactivation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.97.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with five downlink SCells, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.97.1-1 and cell-specific parameters in A.8.16.97.1-2 and A.8.16.97.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are six carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3), deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) and deactivated Cell 6 (SCell5) on radio channel 6 (SCC5) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 SCC4, and SCC5. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell4 in subframe (m+30) for FDD PCell and a MAC message for activation of SCell5 in subframe (m+40) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+44). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39), and (m+45) to (m+49) for FDD PCell, and not outside subframes (m+5) to (m+11), (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell, and a MAC message for deactivation of the SCell5 in subframe (n+40) for FDD PCell and (n+60) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39) and (n+45) to (n+49) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56) and (n+65) to (n+71) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.97.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6 | Six radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell5 | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Cell-individual offset for cells on RF channel number 6 | dB | 0 | Individual offset for cells on SCC5. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3, SCell4 and SCell5 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3, SCell4 and SCell5. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3, SCell4 and SCell5. |

**Table A.8.16.97.1-2: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | | |
|---|---|---|---|---|
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | - |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.97.1-3: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | 17 | | |
| RSRP [Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |

| | | | | |
|---|---|---|---|---|
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.97.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+44).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39) and (m+45) to (m+49) for FDD PCell, and not happen outside subframes (m+5) to (m+11), (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39) and (m+45) to (m+49) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56), and (n+65) to (n+71) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+44) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.98 6 DL CA Activation and Deactivation of Unknown SCell in Non-DRX with generic duplex modes

### A.8.16.98.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with five downlink SCells, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.98.1-1 and cell-specific parameters in A.8.16.98.1-2 and A.8.16.98.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are six carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. Cell 1, Cell 3, Cell 4, Cell5 and Cell6 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3), deactivated Cell 5 (SCell4) on radio channel 5 (SCC4) and deactivated Cell 6 (SCell5) on radio channel 6 (SCC5) but is not aware of Cell 2

(SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3, SCC4 and SCC5. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell4 in a subframe (m+30) for FDD PCell and (m+15) for TDD PCell during activation of SCell1 and a MAC message for activation of SCell5 in a subframe (m+40) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+54). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39) and (m+45) to (m+49) for FDD PCell, and not outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell and a MAC message for deactivation of the SCell5 in subframe (n+40) for FDD PCell and (n+60) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39) and (n+45) to (n+49) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56) and (n+65) to (n+71) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.98.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6 | Six radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell5 | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 6 | dB | 0 | Individual offset for cells on SCC5. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3, SCell4 and SCell5 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3, SCell4 and SCell5. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3, SCell4 and SCell5. |

**Table A.8.16.98.1-2: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| $OCNG_RA^{Note\ 1}$ | dB | | | | | | | | | |
| $OCNG_RB^{Note\ 1}$ | dB | | | | | | | | | |
| $N_{oc}^{Note\ 2}$ | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -infinity | 17 | | 17 | | |

| | | | | | |
|---|---|---|---|---|---|
| RSRP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | | - |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.98.1-3: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.98.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+54).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39) and (m+45) to (m+49) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39) and (n+45) to (n+49) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56) and (n+65) to (n+71) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+54) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.99 7 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX with generic duplex modes

## A.8.16.99.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A1 (Serving cell becomes better than threshold), A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.99.1-1, A.8.16.99.1-2, A.8.16.99.1-3 and A.8.16.99.1-4 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A1 (for only SCell1 i.e. cell2), A2 (PCell and SCells) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 8. At the beginning of T2 the transmission power of cell 8 is increased to the same level as for cell 7, and due to usage of an offset this shall result in reporting of Event A6. Also, at the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, which shall result in reporting of Event A1. At the beginning of T3 the transmission powers of cells 1, 2, 3, 4, 5, 6 and 7 are reduced below a threshold value and this shall result in reporting of Event A2 for Cell 1, for Cell 2, for Cell 3, for Cell 4, for Cell 5, for Cell 6 and Cell 7. Cells 1, 2, 3, 4, 5, 6, 7 and 8 may operate in either FDD or TDD duplex mode according to test configuration.

**Table A.8.16.99.1-1: General test parameters for E-UTRAN 7 DL CA event triggered reporting under fading propagation conditions with 6 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3, 4, 5, 6, 7 | Seven radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell | | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Configured deactivated SCell | | | Cell 7 | Configured deactivated secondary cell on RF channel number 7. |
| Neighbour cell | | | Cell 8 | Neighbour cell to be identified on RF channel number 7. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| TDD special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6, cell 7 and cell 8). |
| TDD uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6, cell 7 and cell 8). |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -98 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in section 9.1.11.2 into account plus margin. |

| | | | | |
|---|---|---|---|---|
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 6 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 7 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | For cell2, cell3, cell4, cell5, cell6 and cell7 |
| T1 | | s | 5 | During this time the cell1, cell3, cell4, cell5, cell6 and cell7 shall be known to the UE; but cell2 and cell8 shall be unknown to the UE. |
| T2 | | s | ≤12 | UE should report Event A1 for cell2 and event A6 for cell8 within 6.4s (20×scellMeasCycle) |
| T3 | | s | 5 | UE should report Event A2 within 200 ms for cell1 and within 1.6s for each of cells 2, 3, 4, 5, 6, and 7 |

**Table A.8.16.99.1-2: Cell specific test parameters for E-UTRAN 7 DL CA event triggered reporting under fading propagation conditions with 6 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | -infinity | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| SCH_RP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 | -87 | -87 | -107 |
| Io [Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |
| Time alignment error relative to cell 2 [Note 5] | μs | ≤ TAE | | | - | | | ≤ TAE | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 3[Note 5] | µs | ≤ TAE | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 6[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 7[Note 5] | µs | ≤ TAE | ≤ TAE | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.99.1-3: Cell specific test parameters for E-UTRAN 7 DL CA event triggered reporting under fading propagation conditions with 6 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 KHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 |
| $\hat{E}_s/I_{ot}$ [Note 3] | dB | 17 | 17 | -3 | 17 | 17 | -3 | 17 | 17 | -3 |
| RSRP [Note 3] | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -87 | -87 | -107 | -87 | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 0 | | | 0 | | |
| Time alignment error relative to cell1 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell5 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell6 Note 5 | µs | - | | | - | | | - | | |
| Time alignment error relative to cell7 Note 5 | µs | - | | | - | | | - | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.99.1-4: Cell specific test parameters for E-UTRAN 7 DL CA event triggered reporting under fading propagation conditions with 6 configured but deactivated SCells in non-DRX with generic duplex modes**

| Parameter | Unit | Cell 7 | | | Cell 8 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 7 | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | -3 | -infinity | 17 | -3 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | -0.09 | -4.76 | -infinity | -0.09 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -107 | -infinity | -87 | -107 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -56.17 +10log ($N_{RB,c}$ /50) | -73.20 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 7 | | |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | 0 | | | 3 | | |
| Time alignment error relative to cell1 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell2 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell3 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell4 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell5 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell6 Note 5 | µs | - | | | NA | | |
| Time alignment error relative to cell7 Note 5 | µs | - | | | NA | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.99.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for Cell 8 with a measurement reporting delay of less than 6.4s (20×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 6.4s (20×measCycleSCell from beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 3 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 4 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 5 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 6 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 7 with a measurement reporting delay of less than 1.6s (5× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.16.100 7 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes

## A.8.16.100.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.3.3.2.1 while at the same time fulfilling the requirement on interruption rate.

The test parameters are given in Table A.8.16.100.1-1, A.8.16.100.1-2 and A.8.16.100.1-3 below. In the test there are seven cells: Cell 1, Cell 2, Cell 3, Cell 4, Cell 5, Cell 6, Cell 7 and Cell 8. Cell 1 is PCell on the primary component (RF Channel 1), Cell 2 is SCell on the secondary component (RF Channel 2), Cell 3 is SCell on the secondary component (RF Channel 3), Cell 4 is SCell on the secondary component (RF Channel 4), Cell 5 is SCell on the secondary component (RF Channel 5), Cell 6 is SCell on the secondary component (RF Channel 6), Cell 7 is SCell on the secondary component (RF Channel 7) and Cell 8 is the neighbour cell on the secondary component (RF Channel 7). It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of four successive time periods, with duration of T1, T2, T3 and T4, respectively. During T1 and T2, Cell2, Cell3, Cell4, Cell5, Cell6 and Cell7 are deactivated. During T1 the UE shall not have any information of Cell 8. Immediately at beginning of T2 the transmission power of Cell 8 is increased to same level as for Cell 7, and due to usage of an offset this shall result in reporting of Event A6. Cells 1, 2, 3, 4, 5, 6, 7 and 8 may operate in either FDD or TDD duplex mode according to test configuration.

At the beginning of T3, the transmission power of Cell 8 is turned off, and the test equipment sends a MAC message for activation of Cell 2 to UE but Cell 3, Cell 4, Cell5, Cell6 and Cell7 remains deactivated. Immediately at beginning of T4 the transmission power of Cell 8 is increased to same level as for Cell 7, and due to usage of an offset this shall result in reporting of Event A6. The UE shall be continuously scheduled in the PCell throughout the whole test and continuously scheduled in Cell2 during T4.

**Table A.8.16.100.1-1: General test parameters for E-UTRAN 7 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6, 7 | Seven radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Configured deactivated SCell | | Cell 7 | Configured deactivated secondary cell on RF channel number 7. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 8 | Neighbor cell to be identified on RF channel number 7. |
| CP length | | | Normal | |
| TDD special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6, cell7 and cell8). |
| TDD uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all TDD cells (cell2, cell3, cell4, cell5, cell6, cell7 and cell8). |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 4 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 5 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 6 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Cell-individual offset for cells on RF channel number 7 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 640 | |
| T1 | | s | 4 | During this time the UE shall be aware of cells 1, 2, 3, 4, 5, 6, and 7 but not cell 8. |
| T2 | | s | ≤15 | UE should report Event A6 within 12.8s (20×scellMeasCycle) |
| T3 | | s | 4 | During this time the UE shall activate cell 2 |
| T4 | | s | ≤4 | UE should report Event A6 within 3.2s (5×scellMeasCycle) |

**Table A.8.16.100.1-2: Cell specific test parameters for E-UTRAN 7 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #1, Cell #2, Cell #3, Cell #4)**

| Parameter | Unit | Cell 1 | | | | Cell 2 | | | | Cell 3 | | | | Cell 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | N/A | N/A | N/A | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |

| | | | | | | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | -85 | 85 | -85 | 85 | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | µs | - | | | | 0 | | | | 0 | | | | 0 | | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | |
| Time alignment error relative to cell 2 Note 5 | µs | - | | | | - | | | | ≤ TAE | | | | ≤ TAE | | | |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE on cell1 from the start of time period T2 and on cell2 from the start of time period T4.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.100.1-3: Cell specific test parameters for E-UTRAN 5 DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions in Non-DRX with generic duplex modes (Cell #5, Cell #6, Cell #7, Cell #8)**

| Parameter | Unit | Cell 5 | | | | Cell 6 | | | | Cell 7 | | | | Cell 8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 | T1 | T2 | T3 | T4 |
| E-UTRA RF Channel Number | | 5 | | | | 6 | | | | 7 | | | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| PDSCH parameters: DL Reference Measurement Channel | | N/A | | | | N/A | | | | N/A | | | | N/A | | | |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | |
| OCNG Pattern defined in A.3.2.1 | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | |
| PBCH_RA | dB | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| PBCH_RB | dB | | | | | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -101 | | | | -101 | | | | -101 | | | | -101 | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | -infinity | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ Note 4 | dB | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | 16 | -0.11 | -infinity | -0.11 | -infinity | -0.11 |
| RSRP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| SCH_RP Note 4 | dBm/15 kHz | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | 85 | -85 | -infinity | -85 | -infinity | -85 |
| Io Note 4 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | AWGN | | | | AWGN | | | | AWGN | | | |
| Antenna Configuration | | 1x2 | | | | 1x2 | | | | 1x2 | | | | 1x2 | | | |
| Timing offset to Cell 1 | μs | 0 | | | | 0 | | | | 0 | | | | 3 | | | |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | | | | ≤ TAE | | | | ≤ TAE | | | | N/A | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Void
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.100.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 12.8s (20×scellMeasCycle) from the beginning of time period T2.

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 3.2s (5×scellMeasCycle) from the beginning of time period T4.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

The UE shall be scheduled on Cell2 continuously from the beginning of T4 to the end. From the start of T4 until the measurement report is received during T4, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.101 7 DL CA Activation and Deactivation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.101.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with six downlink SCells, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.16.101.1-1 and cell-specific parameters in A.8.16.101.1-2, A.8.16.101.1-3 and A.8.16.101.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are seven carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3), deactivated Cell 5 (SCell4) on radio channel 5 (SCC4), deactivated Cell 6 (SCell5) on radio channel 6 (SCC5) and deactivated Cell 7 (SCell6) on radio channel 6 (SCC6) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3 SCC4, SCC5 and SCC6. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell, defines the start of time period T2. The UE receives a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell4 in subframe (m+30) for FDD PCell and (m+15) for TDD, a MAC message for activation of SCell5 in subframe (m+40) for FDD PCell and (m+15) for TDD PCell, and a MAC message for activation of SCell6 in subframe (m+50) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+49). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39), (m+45) to (m+49) and (m+55) to (m+59) for FDD PCell, and not outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, and a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell, a MAC message for deactivation of the SCell5 in subframe (n+40) for FDD PCell and

(n+60) for TDD PCell, and a MAC message for deactivation of the SCell6 in subframe (n+50) for FDD PCell and (n+75) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39), (n+45) to (n+49) and (n+55) to (n+59) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56), (n+65) to (n+71), and (n+70) to (n+76) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.101.1-1: General test parameters for known SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6, 7 | Seven radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell5 | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Configured deactivated SCell6 | | Cell 7 | Configured deactivated secondary cell on RF channel number 7. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Cell-individual offset for cells on RF channel number 6 | dB | 0 | Individual offset for cells on SCC5. |
| Cell-individual offset for cells on RF channel number 7 | dB | 0 | Individual offset for cells on SCC6. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell, SCell2, SCell3, SCell4, SCell5, and SCell6 shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3, SCell4, SCell5, and SCell6. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3, SCell4, SCell5, and SCell6. |

**Table A.8.16.101.1-2: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | 17 | | | 17 | | |
| RSRP[Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP[Note 3] | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io[Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | 0 | | |
| Time alignment error relative to cell 1[Note 5] | μs | - | | | ≤ TAE | | | ≤ TAE | | |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 6 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.101.1-3: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 6 Note 5 | µs | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.101.1-4: Cell specific test parameters for known SCell1 activation**

| Parameter | Unit | Cell 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 7 | | | | | | | | |
| Duplex mode | | FDD or TDD | | | | | | | | |
| TDD special subframe configuration | | 6 | | | | | | | | |
| TDD uplink-downlink configuration | | 1 | | | | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | µs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 4 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 5 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 6 Note 5 | µs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.16.101.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+49).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39), (m+45) to (m+49) and (m+55) to (m+59) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39), (n+45) to (n+49) and (n+55) to (n+59) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56), (n+65) to (n+71) and (n+80) to (n+86) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+49) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.102 7 DL CA Activation and Deactivation of Unknown SCell in Non-DRX with generic duplex modes

## A.8.16.102.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in section 7.7 for UE configured with six downlink SCells, when the SCell is unknown by the UE at the time of activation.

The test parameters are given in Tables A.8.16.102.1-1 and cell-specific parameters in A.8.16.102.1-2, A.8.16.102.1-3 and A.8.16.102.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are seven carriers, each with one cell. Cells may operate in either FDD or TDD duplex mode according to test configuration. Cell 1, Cell 3, Cell 4, Cell5, Cell6 and Cell7 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), deactivated Cell 3 (SCell2) on radio channel 3 (SCC2), deactivated Cell 4 (SCell3) on radio channel 4 (SCC3), deactivated Cell 5 (SCell4) on radio channel 5 (SCC4), deactivated Cell 6 (SCell5) on radio channel 6 (SCC5) and deactivated Cell 7 (SCell6) on radio channel 7 (SCC6) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring PCC, SCC2, SCC3, SCC4, SCC5 and SCC6. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. During T1 SCell1 is powered off and the UE is not aware of SCell1.

A MAC message for activation of SCell1 is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m, where m is an even number for FDD PCell and 4 or 9 for TDD PCell. The point in time at which the MAC message for activation of SCell1 is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 transmission power of SCell1 is increased to same level as for PCell. The test equipment sends a MAC message for activation of SCell2 in subframe (m+10) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell3 in subframe (m+20) for FDD PCell and (m+15) for TDD PCell, a MAC message for activation of SCell4 in a subframe (m+30) for FDD PCell and (m+15) for TDD PCell during activation of SCell1, a MAC message for activation of SCell5 in a subframe (m+40) for FDD PCell and (m+15) for TDD PCell during activation of SCell1 and a MAC message for activation of SCell6 in a subframe (m+50) for FDD PCell and (m+15) for TDD PCell during activation of SCell1. The UE shall be able to report valid CSI for the activated SCell1 at latest in a subframe (m+59). The UE shall start reporting CSI for SCell1 in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCells shall not occur outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39), (m+45) to (m+49) and (m+55) to (m+59) for FDD PCell, and not outside subframes (m+5) to (m+11 and (m+20) to (m+26) for TDD PCell.

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is an even number for FDD PCell and 4 or 9 for TDD PCell, is received at the UE antenna connector. The test equipment sends a MAC message for deactivation of the SCell2 in subframe (n+10) for

FDD PCell and (n+15) for TDD PCell, a MAC message for deactivation of the SCell3 in subframe (n+20) for FDD PCell and (n+30) for TDD PCell, a MAC message for deactivation of the SCell4 in subframe (n+30) for FDD PCell and (n+45) for TDD PCell, a MAC message for deactivation of the SCell5 in subframe (n+40) for FDD PCell and (n+60) for TDD PCell and a MAC message for deactivation of the SCell6 in subframe (n+50) for FDD PCell and (n+65) for TDD PCell. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell interruption due to the deactivation of SCells shall not occur outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39), (n+45) to (n+49) and (n+55) to (n+59) for FDD PCell, and not outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56), (n+65) to (n+71) and (n+80) to (n+86) TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.16.102.1-1: General test parameters for unknown SCell1 activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3, 4, 5, 6, 7 | Seven radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| Configured deactivated SCell2 | | Cell 3 | Configured deactivated secondary cell on RF channel number 3. |
| Configured deactivated SCell3 | | Cell 4 | Configured deactivated secondary cell on RF channel number 4. |
| Configured deactivated SCell4 | | Cell 5 | Configured deactivated secondary cell on RF channel number 5. |
| Configured deactivated SCell5 | | Cell 6 | Configured deactivated secondary cell on RF channel number 6. |
| Configured deactivated SCell6 | | Cell 7 | Configured deactivated secondary cell on RF channel number 7. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC2. |
| Cell-individual offset for cells on RF channel number 4 | dB | 0 | Individual offset for cells on SCC3. |
| Cell-individual offset for cells on RF channel number 5 | dB | 0 | Individual offset for cells on SCC4. |
| Cell-individual offset for cells on RF channel number 6 | dB | 0 | Individual offset for cells on SCC5. |
| Cell-individual offset for cells on RF channel number 7 | dB | 0 | Individual offset for cells on SCC6. |
| Filter coefficient | | 0 | L3 filtering is not used. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell, SCell2, SCell3, SCell4, SCell5 and SCell6 shall be known and the SCell1 configured. |
| T2 | s | 1 | During this time the UE shall activate the SCell1, SCell2, SCell3, SCell4, SCell5 and SCell6. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1, SCell2, SCell3, SCell4, SCell5 and SCell6. |

**Table A.8.16.102.1-2: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | -infinity | 17 | | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | | -infinity | 17 | | 17 | | |
| RSRP[Note 3] | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | |
| SCH_RP[Note 3] | dBm/15 kHz | -87 | | | -infinity | -87 | | -87 | | |
| Io[Note 3] | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |

| | | | | |
|---|---|---|---|---|
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | µs | - | - | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 4 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 5 Note 5 | µs | - | - | - |
| Time alignment error relative to cell 6 Note 5 | µs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.102.1-3: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 4 | | | Cell 5 | | | Cell 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 4 | | | 5 | | | 6 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | μs | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 5 | μs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 5 | μs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 5 | μs | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 5 | μs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 5 | μs | - | - | ≤ TAE |
| Time alignment error relative to cell 6 Note 5 | μs | - | - | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

**Table A.8.16.102.1-4: Cell specific test parameters for unknown SCell1 activation**

| Parameter | Unit | Cell 7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | | | |
| E-UTRA RF Channel Number | | 7 | | | | | | | | |
| Duplex mode | | FDD or TDD | | | | | | | | |
| TDD special subframe configuration | | 6 | | | | | | | | |
| TDD uplink-downlink configuration | | 1 | | | | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | - | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | |
| $\hat{E}_s/I_{ot}$ | dB | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | |
| Antenna Configuration | | 1x2 | | |
| Timing offset to Cell 1 | µs | 0 | | |
| Time alignment error relative to cell 1 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 2 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 3 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 4 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 5 Note 5 | µs | ≤ TAE | | |
| Time alignment error relative to cell 6 Note 5 | µs | ≤ TAE | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.102.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+8) and (m+9) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+59).

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCells activation shall not happen outside subframes (m+5) to (m+9), (m+15) to (m+19), (m+25) to (m+29), (m+35) to (m+39), (m+45) to (m+49) and (m+55) to (m+59) for FDD PCell, and not happen outside subframes (m+5) to (m+11) and (m+20) to (m+26) for TDD PCell.

During T3 interruption of PCell during SCells deactivation shall not happen outside subframes (n+5) to (n+9), (n+15) to (n+19), (n+25) to (n+29), (n+35) to (n+39), (n+45) to (n+49) and (n+55) to (n+59) for FDD PCell, and not happen outside subframes (n+5) to (n+11), (n+20) to (n+26), (n+35) to (n+41), (n+50) to (n+56), (n+65) to (n+71) and (n+80) to (n+86) for TDD PCell.

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+59) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.16.103 Hibernation and Activation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.103.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell hibernation and activation delays are within the requirements stated in section 7.7 for UE configured with a single downlink SCell, when the SCell is known by the UE at the time of hibernation and activation.

The test parameters are given in Tables A.8.16.103.1-1 and cell-specific parameters in A.8.16.103.1-2 below. The test consists of five successive time periods, with duration of T1, T2, T3, T4, and T5, respectively. There are two carriers, each with one cell. Cell 1 and Cell 2 operate in either FDD or TDD duplex mode according to test configuration. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). The UE starts measuring the SCC1. The test equipment sends a MAC message for hibernation of the SCell1.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the hibernated (dormant) SCell at latest in subframe (m+24). The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) if the UE has available uplink resources to report CQI for the SCell but has not completed the SCell hibernation. Any PCell interruption due to hiberntion of the SCell shall occur in the subframes (m+5) to (m+9) if FDD PCell and (m+5) to (m+11) if TDD PCell.

Time period T3 starts when a MAC message for the activation of the SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The UE shall accomplish the activation of the dormant SCell no later than subframe (n+8) in FDD SCell and (n+11) in TDD SCell. Any PCell interruption due to the activation shall occur in the subframes (n+5) to (n+7) in FDD PCell, and (n+5) to (n+10) in TDD PCell.

Time period T4 starts when a MAC message for the hibernation of the activated SCell, sent from the test equipment to the UE in a subframe # denoted o which is an even number, is received at the UE antenna connector. The UE shall accomplish the hibernation of the SCell in a subframe (o+8). Any PCell interruption due to the hibernation shall occur in the subframes (o+5) to (o+9) for FDD PCell and (o+5) to (o+11) for TDD PCell.

During T3 and T4, the UE shall be continuously scheduled in the SCell1.

Time period T5 starts when a MAC message for deactivation of the dormant SCell, sent from the test equipment to the UE in a subframe # denoted p which is an even number, is received at the UE antenna connector. The UE shall accomplish the deactivation of the dormant SCell in a subframe (p+8). Any PCell interruption due to the hibernation shall occur in the subframes (p+5) to (p+9) for FDD PCell, and (p+5) to (p+11) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation, hibernation and deactivation of SCell, respectively.

The test equipment verifies the hibernation time by counting the subframes from the time when the SCell hibernation command is sent and until a CSI report with other than CQI index 0 is received.

The test equipment verifies the activation time by checking the delay until receiving the first ACK/NACK sent from the Scell being activated.

The test equipment verifies the CSI report from the dormant SCell after the hibernation procedure is completed contains CQI index other than 0.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.103.1-1: General test parameters for known SCell hibernation and activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell shall be known and the SCell1 is configured and detected. |
| T2 | s | 1 | During this time the UE shall hibernate the SCell1 and report a valid CQI. |
| T3 | s | 1 | During this time the UE shall activate the SCell1 and report a valid CQI. |
| T4 | s | 1 | During this time the UE shall hibernate the SCell1 and report a valid CQI. |
| T5 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.103.1-2: Cell specific test parameters for known SCell hibernation and activation**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| Duplex mode | | FDD or TDD | | | | | FDD or TDD | | | | |

| | | | |
|---|---|---|---|
| TDD special subframe configuration | | 6 | 6 |
| TDD uplink-downlink configuration | | 1 | 1 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.7 FDD (Note 6)<br>10MHz: R.3 FDD (Note 6)<br>20MHz: R.6 FDD (Note 6)<br><br>5MHz: R.4 TDD (Note 6)<br>10MHz: R.0 TDD (Note 6)<br>20MHz: R.3 TDD (Note 6) |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/ChBW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |

| | | | |
|---|---|---|---|
| Timing offset to Cell 1 | µs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: PDSCH RMC is only applicable to T3 and T4 period. Scheduling in T4 is only to verify that UE does not keep the SCell in activated state after receiving MAC CE for hibernation.

## A.8.16.103.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in subframe (m+8), or in subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+9) and (m+8) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+24) and continue to send CSI reports for SCell 1 with non-zero CQI index until the beginning of T3.

During T2, interruption of PCell during SCell activation between subframe (m+5) to (m+9) for FDD PCell, or (m+5) to (m+11) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T2, the missing ACK/NACK sent in PCell outside subframes (m+5) to (m+9) for FDD PCell, or (m+5) to (m+11) for TDD PCell, shall be less than 0.5% of the total number of the expected ACK/NACK.

During T3 the UE shall continue to send CSI reports for SCell1 with non-zero CQI index unless the CQI measurement or CQI reporting is interrupted by the Scell activation.

During T3, the UE shall send ACK/NACK for the PDSCH data scheduled after subframe (n+8) for FDD SCell1 and (n+11) for TDD SCell1.

During T3, interruption of PCell during SCell activation shall not happen outside subframes (n+5) to (n+7) for FDD PCell and (n+5) to (n+10) for TDD PCell. Interruption of PCell during SCell activation between subframe (n+5) to (n+7) for FDD PCell, or (n+5) to (n+10) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T4, the UE shall not send ACK/NACK for the PDSCH data scheduled in SCell1 after subframe (o+8).

During T4, the UE shall send CSI report for SCell 1 with non-zero CQI index after subframe (o+9) for FDD PCell and (o+11) for TDD PCell and continue to send CSI reports for SCell 1 with non-zero CQI index until the beginning of T5.

During T4, interruption of PCell during SCell hibernation between subframe (o+5) to (o+9) for FDD PCell, or (o+5) to (o+11) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T4, the missing ACK/NACK sent in PCell outside subframes (o+5) to (o+9) for FDD PCell, or (o+5) to (o+11) for TDD PCell, shall be less than 0.5% of the total number of the expected ACK/NACK.

During T5, the UE shall stop sending CSI report for SCell at latest in a subframe (p+8).

During T5, interruption of PCell during SCells deactivation shall not happen outside subframes (p+5) to (n+9) for FDD PCell, and not outside subframes (p+5) to (p+11) for TDD PCell.

All of the above test requirements shall be fulfilled in order for the observed SCell1 hibernation delay, activation delay and deactivation delay to be counted as correct. The rate of correct observed SCell1 hibernation delay, activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.104 Hibernation and Activation of Unknown SCell in Non-DRX with generic duplex modes

## A.8.16.104.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell hibernation and activation delays are within the requirements stated in section 7.7 for UE configured with single downlink SCells, when the SCell is unknown by the UE at the time of hibernation and activation.

The test parameters are given in Tables A.8.16.104.1-1 and cell-specific parameters in A.8.16.104.1-2 below. The test consists of five successive time periods, with duration of T1, T2, T3, T4, and T5, respectively. There are two carriers, each with one cell. Cell 1 and Cell 2 may operate in either FDD or TDD duplex mode according to test configuration. Cell 1 has constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 (Cell 2) becomes configured on radio channel 2 (SCC1). During T1 the SCell 1 is powered off and UE is not aware of SCell.

A MAC message for hibernation of SCell is sent by the test equipment 100ms after the RRC message, in a subframe # denoted m which is an even number. The point in time at which the MAC message for hibernation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of Cell 2 is increased to same level as for Cell 1. The UE shall be able to report valid CSI for the hibernated (dormant) SCell at latest in subframe (m+34) provided that the SCell 1 can be successfully detected on the first attempt. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell hibernation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9) if FDD PCell and (m+5) to (m+11) if TDD PCell.

Time period T3 starts when a MAC message for the activation of SCell, sent from the test equipment to the UE in a subframe # denoted n which is an even number, is received at the UE antenna connector. The UE shall carry out the activation of the SCell in a subframe (n+8) in FDD SCell and (n+11) in TDD SCell. Any PCell interruption due to the activation shall occur in the subframes (n+5) to (n+7) in FDD PCell, and (n+5) to (n+10) in TDD PCell.

Time period T4 starts when a MAC message for the hibernation of the activated SCell, sent from the test equipment to the UE in a subframe # denoted o which is an even number, is received at the UE antenna connector. The UE shall carry out the hibernation of the SCell in a subframe (o+8). Any PCell interruption due to the hibernation shall occur in the subframes (o+5) to (o+9) for FDD PCell and (o+5) to (o+11) for TDD PCell.

During T3 and T4, the UE shall be continuously scheduled in the SCell1.

Time period T5 starts when a MAC message for deactivation of the dormant SCell, sent from the test equipment to the UE in a subframe # denoted p which is an even number, is received at the UE antenna connector. The UE shall carry out deactivation of the dormant SCell in a subframe (p+8). Any PCell interruption due to the hibernation shall occur in the subframes (p+5) to (p+9) for FDD PCell, and (p+5) to (p+11) for TDD PCell.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation, hibernation and deactivation of SCell, respectively.

The test equipment verifies the hibernation time by counting the subframes from the time when the SCell hibernation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the activation time by monitoring ACK/NACK sent in SCell after the hibernation delay specified in section 7.7.14.

The test equipment verifies the CSI report from the dormant SCell after the hibernation procedure is completed contains CQI index other than 0.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.16.104.1-1: General test parameters for unknown SCell hibernation and activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | ms | 100 | During this time the PCell shall be known and the SCell1 is configured and detected. |
| T2 | s | 1 | During this time the UE shall hibernate the SCell1 and report a valid CQI. |
| T3 | s | 1 | During this time the UE shall activate the SCell1. |
| T4 | s | 1 | During this time the UE shall hibernate the SCell1 and report a valid CQI. |
| T5 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.16.104.1-2: Cell specific test parameters for unknown SCell hibernation and activation**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| Duplex mode | | FDD or TDD | | | | | FDD or TDD | | | | |
| TDD special subframe configuration | | 6 | | | | | 6 | | | | |
| TDD uplink-downlink configuration | | 1 | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | | 5MHz: R.7 FDD (Note 6)<br>10MHz: R.3 FDD (Note 6)<br>20MHz: R.6 FDD (Note 6)<br><br>5MHz: R.4 TDD (Note 6)<br>10MHz: R.0 TDD (Note 6)<br>20MHz: R.3 TDD (Note 6) | | | | |

| | | | | |
|---|---|---|---|---|
| PCFICH/ PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | 0 | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | - infinity | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | - infinity | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | - infinity | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | - infinity | -87 |
| Io Note 3 | dBm/Ch BW | -59.13 +10log ($N_{RB,c}$ /50) | -76.22 +10log ($N_{RB,c}$ /50) | -59.13 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | |
| Antenna Configuration | | 1x2 | 1x2 | |
| Timing offset to Cell 1 | µs | - | 0 | |

| | | | |
|---|---|---|---|
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 6: PDSCH RMC is only applicable to T3 and T4 period. Scheduling in T4 is only to verify that UE does not keep the SCell in activated state after receiving MAC CE for hibernation.

## A.8.16.104.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in subframe (m+8), or in subframe (m+10) for FDD PCell and (m+9) for TDD PCell, if the subframe (m+8) was subject to interruption, or in subframe (m+13) for TDD PCell, if the subframes (m+9) and (m+8) were subject to interruption. Whether CSI report in subframe (m+8) / (m+9) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8) / (m+9).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+34) and continue to send CSI reports for SCell 1 with non-zero CQI index until the beginning of T3.

During T2, interruption of PCell during SCell activation between subframe (m+5) to (m+9) for FDD PCell, or (m+5) to (m+11) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T2, the missing ACK/NACK sent in PCell outside subframes (m+5) to (m+9) for FDD PCell, or (m+5) to (m+11) for TDD PCell, shall be less than 0.5% of the total number of the expected ACK/NACK.

During T3, the UE shall send ACK/NACK for the PDSCH data scheduled after subframe (n+8) for FDD SCell1 and (n+11) for TDD SCell1.

During T3, interruption of PCell during SCell activation shall not happen outside subframes (n+5) to (n+7) for FDD PCell and (n+5) to (n+10) for TDD PCell. Interruption of PCell during SCell activation between subframe (n+5) to (n+7) for FDD PCell, or (n+5) to (n+10) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T4, the UE shall not send ACK/NACK for the PDSCH data scheduled in SCell1 after subframe (o+8).

During T4, the UE shall send CSI report for SCell 1 with non-zero CQI index after subframe (o+9) for FDD PCell and (o+11) for TDD PCell.

During T4, interruption of PCell during SCell hibernation between subframe (o+5) to (o+9) for FDD PCell, or (o+5) to (o+11) for TDD PCell, shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

During T4, the missing ACK/NACK sent in PCell outside subframes (o+5) to (o+9) for FDD PCell, or (o+5) to (o+11) for TDD PCell, shall be less than 0.5% of the total number of the expected ACK/NACK.

During T5, the UE shall stop sending CSI report for SCell at latest in a subframe (p+8).

During T5, interruption of PCell during SCells deactivation shall not happen outside subframes (p+5) to (n+9) for FDD PCell, and not outside subframes (p+5) to (p+11) for TDD PCell.

All of the above test requirements shall be fulfilled in order for the observed SCell1 hibernation delay, activation delay and deactivation delay to be counted as correct. The rate of correct observed SCell1 hibernation delay, activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+34) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.16.105 Idle Mode measurements of inter-frequency CA candidate cells for early reporting

## A.8.16.105.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly retains the detected cell status for the idle mode CA measurement when UE transitions from RRC Connected mode to Idle mode when the UE has entered Idle mode, and that the UE performs the required measurements on the serving cell and the configured overlapping inter-frequency carrier for idle mode measurement reporting. This test will partly verify the Idle mode CA measurements in clause 4.9.

The test parameters are given in Tables A.8.16.105.1-1, A.8.16.105.1-2, A.8.16.105.1-3 and A.8.16.105.1-4 below. In the test there are two cells, cell 1 is the PCell in connected mode, and cell 2 is the SCell in connected mode.

The test consists of 4 successive time periods, with time duration of T1, T2, T3 and T4 respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. During T1 cell 2, SCell, shall be configured and activated. The UE shall be configured for periodic CSI reporting in the PCell with a reporting periodicity of [5] ms. Time duration T2 starts [50] ms after SCell is activated. After T2, the UE is configured with idle mode CA measurements on SCell carrier (which is also configured for idle mode mobility). In the test, connected mode DRX configuration is not enabled. The connection is released after the UE has sent valid CQI report for the activated SCell. T3 starts when the connection is released. During the time periods T3 UE is in Idle mode. The UE is configured to perform inter-frequency measurements in idle mode on the SCell carrier (overlapping carrier). During T3, [500] ms after T3, the signal level of the inter-frequency carrier configured for idle mode measurements (overlapping carrier) is changed. At T4 the UE is paged for connection setup and requested by the network to send idle mode measurements.

**Table A.8.16.105.1-1: General test parameters for Connected mode Idle Mode measurements of inter-frequency CA candidate cells for early reporting.**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD<br><br>5MHz: OP.4 TDD<br>10MHz: OP.0 TDD<br>20MHz: OP.3 TDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: OP.11 TDD<br>10MHz: OP.6 TDD<br>20MHz: OP.10 TDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 |
| PCell | | Cell 1 | Cell 1 is on RF channel number 1 |
| SCell | | Cell 2 | Cell 2 is on RF channel number 2 |
| CP length | | Normal | |
| DRX | | OFF | OFF |
| T331 | S | 300 | |
| T1 | S | 10 | Prior to T1 UE shall be fully synchronized to cell 1 and cell 2. During T1 UE shall be configured with CA with Cell 1 as PCell and Cell 2 as SCell. Cell 2, SCell, shall be configured and activated. The UE shall be configured for periodic CSI reporting in the PCell with a reporting periodicity of [5] ms. T1 starts when the SCell is activated. When UE reports valid CQI for the activated SCell T2 is started. |

| | | | |
|---|---|---|---|
| T2 | S | 3 | During T2 RRC Connection is configured with idle mode CA measurements in cell 2. Connection is released after configuration and valid CQI report has been transmitted for the SCell. |
| T4 | S | 10 | UE is paged for connection setup. During the connection setup the UE is requested to send an early measurement report. |

**Table A.8.16.105.1-2: Cell specific test parameters for Connected mode for Idle Mode measurements of inter-frequency CA candidate cells for early reporting.**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T4 | T1 | T2 | T4 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| Duplex Mode | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 | | | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | | | -98 | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | | | 0 | | |
| SCH_RP Note 4 | dBm/15 kHz | -94 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | | | 0 | | |
| Propagation Condition | | AWGN | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.16.105.1-3: General test parameters for Idle Mode for Idle Mode measurements of inter-frequency CA candidate cells for early reporting**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Tx condition | Active cell | | Cell 1 | Former PCell |
| | Neighbour cell | | Cell 2 | Former SCell |
| E-UTRA RF Channel Number | | | 1 | FDD carrier frequency for Cell 1. |
| E-UTRA RF Channel Number | | | 2 | FDD carrier frequency for Cell 2. |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel BW for RF channel 1 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel BW for RF channel 2 |
| PRACH configuration | | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| DRX cycle length | | ms | 1280 | The value shall be used for all cells in the test. |
| T3 | | s | [10] | T3 is started when connection is released. During T3, UE is in idle mode. Cell 1 and Cell 2 are both still detectable by the UE during T3 and prior to the start of period T4.<br>The signal level of Cell 2 for idle mode measurements is changed [500]ms after release of the connection. |

**Table A.8.16.105.1-4: Cell specific test parameters for Idle Mode for Idle Mode measurements of inter-frequency CA candidate cells for early reporting**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| | | **T3** | **T3** |
| E-UTRA RF Channel Number | MHz | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 | 5MHz, $N_{RB,c}$ = 25<br>10MHz, $N_{RB,c}$ = 50<br>20MHz, $N_{RB,c}$ = 100 |
| OCNG Patterns defined in A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note 1] | | | |
| OCNG_RB[Note 1] | | | |
| Qrxlevmin | dBm | -140 | -140 |
| Pcompensation | dB | 0 | 0 |
| $Qhyst_s$ | dB | 0 | 0 |
| $Qoffset_{s,n}$ | dB | 0 | 0 |
| Cell_selection_and_reselection_quality_measurement | | RSRP | RSRP |

| | | | |
|---|---|---|---|
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | |
| $\hat{E}_s/I_{ot}$ | dB | 16 | 14 |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 14 |
| RSRP Note3 | dBm/15 kHz | -82 | -84 |
| Treselection | s | 0 | 0 |
| Reselection offset | dB | 0 | 0 |
| Sintrasearch | dB | Not sent | Not sent |
| SnonIntraSearchP | dB | 50 | Not sent |
| SnonIntraSearchQ | dB | Not sent | Not sent |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.16.105.2 Test Requirements

The UE behaviour during time durations T2, T3 and T4 shall be as follows:

During time durations T2 the UE shall start transmitting valid CSI reports for the activated SCell at least in all subframes configured for SCell CSI reporting on Cell 1 (PCell).

During the time-period T3 the connection is released, and UE enters idle mode. During the time period T3 the UE is in Idle mode and the signal level of cell 2 is changed. The UE shall not perform reselection. The UE shall perform Idle Mode CA measurement according to Section 4.9.

At the start of T4 the UE is paged for connection setup. During the connection setup the UE is requested to transmit early measurement report. The UE shall send early measurement report to the PCell.

After receiving the requested early measurement report, the test equipment verifies the accuracy of measurement reported for serving Cell 1 and Cell 2 meets the requirements in Section 9.1.2B and Section 9.1.3B, respectively and test ends.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.16.106 Direct Activation of Known SCell in Non-DRX with generic duplex modes

### A.8.16.106.1 Test Purpose and Environment

The purpose of this test is to verify that the direct SCell activation delays are within the requirements stated in clause 7.7.18 for UE configured with a single downlink SCell, when the SCell is known by the UE at the time of direct activation.

The test parameters are given in Tables A.8.16.106.1-1 and cell-specific parameters in A.8.16.106.1-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two carriers, each with one cell. Cell 1 and Cell 2 operate in either FDD or TDD duplex mode according to test configuration. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (SCell1) on radio channel 2 (SCC1). The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1, the UE is configured to measure radio channel 2 and starts detecting the Cell 2 (SCell1) on radio channel 2 (SCC1). Measurement gap pattern with ID #0 as specified in Table 8.1.2.1-1 is configured to enable inter-frequency monitoring on SCC1. During T1 Cell 2 is detected and measured and measurement report is sent by the

UE to the test equipment. Thereafter measurement gaps are deconfigured by the test equipment. Test equipment sends the RRCConnectionReconfiguration message for the activation of the SCell within $N_{act_known}$ to ensure the configured SCell is known.

Time period T2 starts when UE receives the RRCConnectionReconfiguration message for the activation of the SCell, sent from the test equipment to the UE received in a subframe # denoted m at the UE antenna connector.

The E-UTRAN shall use *RRCConnectionReconfiguration* message with parameter *sCellState* set to *activated* for the SCell1 (Cell 2), which causes the SCell1 to become configured and activated on radio channel 2 (SCC1). The message is sent from the test equipment to the UE and is received in a subframe # denoted m at the UE antenna connector. The UE shall accomplish the activation of the SCell no later than subframe (m+ $N_{direct}$).

Time period T3 starts at (m+ $N_{direct}$), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

During T3, the UE shall be continuously scheduled in the SCell1.

The test equipment verifies the activation time by counting the subframes from the time when the direct SCell activation is sent and until a CSI report with other than CQI index 0 is received.

The test equipment verifies the CSI report from the direct activated SCell after the activation procedure is completed contains CQI index other than 0.

**Table A.8.16.106.1-1: General test parameters for known SCell direct activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Deconfigured deactivated SCell | | Cell 2 | Deconfigured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| Gap Pattern Id | | 0 | As specified in clause 8.1.2.1. |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on SCC1. |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 1 | During this time the PCell shall be known and the SCell1 is detected, and UE shall report a valid CQI for PCell. |
| T2 | s | $N_{direct}$ | During this time the UE shall be configured with directly activated SCell1. |
| T3 | s | 1 | During this time the UE shall report a valid CQI for both PCell and SCell1. |

**Table A.8.16.106.1-2: Cell specific test parameters for known SCell direct activation case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| Duplex mode | | FDD or TDD | | | FDD or TDD | | |
| TDD special subframe configuration | | 6 | | | 6 | | |
| TDD uplink-downlink configuration | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | |
|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD<br><br>5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD<br><br>5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD<br><br>5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD<br><br>5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| $\hat{E}_s/I_{ot}$ | dB | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13<br>+10log<br>($N_{RB,c}$ /50) | -59.13<br>+10log<br>($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.16.106.2 Test Requirements

The UE shall accomplish the activation of the SCell no later than subframe m+$N_{direct}$.

Time period T3 starts at (m+ $N_{direct}$), at which point UE shall be reporting a valid CQI for both PCell and SCell1.

NOTE: The direct SCell activation delay, $N_{direct}$, can be expressed as: $N_{direct} = T_{RRC_Process}\ [+T_1] + T_{time_direct}$, where:

$T_{RRC_Process}$ is the RRC procedure delay = 20 ms which is the RRC procedure delay defined for SCell addition in clause 11.2 of TS 36.331 [2],

$T_1$ is the delay from subframe m+ $T_{RRC_Process}$ until the transmission of RRCConnectionReconfigurationComplete message

$T_{time_direct}$ is the direct SCell activation delay. If the SCell is known, then $T_{time_direct}$ is 20 ms. If the SCell is unknown, then $T_{time_direct}$ is 30 ms provided the SCell can be successfully detected on the first attempt.

This gives a total of $N_{direct}$ = 20 + $T_1$ + 20 ms = 40 + $T_1$ ms for FDD and TDD.

During T3 the UE shall send CSI reports for SCell1 with non-zero CQI index and continue to send CSI reports for SCell 1 with non-zero CQI index until the end of T3. All of the above test requirements shall be fulfilled in order for the observed SCell1 direct activation delay to be counted as correct. The rate of correct observed SCell1 direct activation delay during repeated tests shall be at least 90%.

## A.8.16.107 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX with *highSpeedEnhMeasFlag2-r16*

### A.8.16.107.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements for UE configured with *highSpeedEnhMeasFlag2-r16* in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.107.1-1 and A.8.16.107.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.16.107.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| A2 Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |

| | | | | |
|---|---|---|---|---|
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 160 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤5 | UE shall report Event A6 within 1.6s (10×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 480ms for cells 1 and 2, respectively. |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.107.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | | 2x2 Low | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP[Note 3] | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP[Note 3] | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |

| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
|---|---|---|---|---|---|---|---|---|---|---|
| Propagation Condition | | AWGN | | | | | | AWGN 1750 Hz[Note5] | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: The AWGN 1750 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750 Hz.

### A.8.16.107.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 1.6s (10×measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 480ms (3× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.16.108 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX with *highSpeedEnhMeasFlag2-r16*

### A.8.16.108.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements for UE configured with *highSpeedEnhMeasFlag2-r16* in clause 8.3.3.2.1.

The test parameters are given in Tables A.8.16.108.1-1 and A.8.16.108.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.16.108.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |

| | | | | |
|---|---|---|---|---|
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211 [16]. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 160 | |
| Cell2 timing offset to cell1 | | µs | 0 | |
| Time alignment error between cell2 and cell1 | | µs | ≤ Time alignment error as specified in TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Cell3 timing offset to cell1 | | µs | 3 | Synchronous cells |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤5 | UE shall report Event A6 within 1.6s (10×scellMeasCycle) |
| T3 | | s | 5 | UE shall report Event A2 within 200 ms and 480ms for cells 1 and 2, respectively. |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.16.108.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions with *highSpeedEnhMeasFlag2-r16***

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Correlation Matrix and Antenna Configuration | | 2x2 Low | | | 2x2 Low | | | 2x2 Low | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| Propagation Condition | | AWGN | | | | | | AWGN 1750 Hz Note5 | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: The AWGN 1750 Hz condition is a non fading propagation channel with one tap. Doppler shift is a constant 1750 Hz.

### A.8.16.108.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 1.6s (10× measCycleSCell) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 200 ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 480ms (3× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.17 RSTD Measurements for E-UTRAN Carrier Aggregation

## A.8.17.1 E-UTRAN FDD RSTD measurement reporting delay test case

### A.8.17.1.1 Test Purpose and Environment

The purpose of the test case is to verify that the RSTD measurements meet the requirements specified in Clause 8.4 in a synchronized network environment with fading propagation conditions. This test case will verify the measurement period requirements specified in Clause 8.4.3 for RSTD measurements performed on the secondary component carrier and also the measurement period requirements for RSTD measurements performed on both the primary and secondary component carriers specified in Clause 8.4.4.

In the tests, there are two configured component carriers: PCC and SCC, and three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is PCell on the PCC, Cell 2 is an active SCell on the SCC, and Cell 3 is a neighbour cell on the SCC. In all tests, Cell 2 is the OTDOA assistance data reference cell.

The test case includes two tests. Test 1 is designed for the scenario where the UE receives OTDOA assistance data with cells on SCC, and the UE is expected to report RSTD measurements performed on SCC only. Test 2 is designed for the scenario where the UE receives OTDOA assistance data with cells on PCC and SCC, and the UE is expected to report RSTD measurements performed on PCC and on SCC.

Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 is active only in T2 and T3, and Cell 3 is active only during T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the OTDOA assistance data

reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.17.1.1-1, Table A.8.17.1.1-2, Table A.8.17.1.1-3 and Table A.8.17.1.1-4.

**Table A.8.17.1.1-1: General test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCell | | Cell 1 | | PCell is on RF channel 1 (PCC). |
| SCell | | Cell 2 | | SCell on RF channel 2 (SCC). Cell 2 is the assistance data reference cell. |
| Other neighbor cell | | Cell 3 | | Neighbor cell on RF channel 2 (SCC). |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | | As specified in clause A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 171 for all cells on PCC<br>181 for all cells on SCC | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 1 | | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 2 – PCI of Cell 3)mod6=0 | | The PCI of Cell 1 is selected randomly. PCIs of Cell 2 and Cell 3 are selected randomly such that the relative subcarrier shifts of PRS patterns among these cells are as given by the condition |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.17.1.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 2: 1<br>Cell 3 to Cell 2: -1 | | PRS are transmitted from synchronous cells |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | | The value of time alignment error depends upon the type of carrier aggregation. |
| Expected RSTD | µs | Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | Cell 1: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| | | 16 cells in total | | |

| | | | | |
|---|---|---|---|---|
| Cells in OTDOA assistance data | | OTDOA neighbor cells include Cell 3 and other 14 cells on SCC | OTDOA neighbor cells include Cell 1 and other 7 cells on PCC, and Cell 3 and other 6 cells on SCC | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. Cell 1 (when included) appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 3 always appears at random places in the second half of the list. |
| prs-SubframeOffset | | Cells on PCC: 310<br>Cells on SCC, except reference cell: 0 | | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC, except reference cell: 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000' | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.17.1.1-2: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | N/A | N/A |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA[Note 1] | | | | |
| OCNG_RB[Note 1] | | | | |

| | | | | |
|---|---|---|---|---|
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | N/A | N/A |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | N/A | N/A |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.17.1.1-3: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | | OP.6 FDD | | OP.6 FDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |
| PRS_RA | dB | -6 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -4 | -Infinity | -Infinity | -1 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -4 | -Infinity | -Infinity | -1 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.94 | N/A | N/A | -66.68 | -70.11 | N/A |
| PRP Note 4 | dBm/ 15 kHz | -102 | -Infinity | -Infinity | -96 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -99 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -4 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes. |

**Table A.8.17.1.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

### A.8.17.1.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.4.

In Test 1, the UE shall perform and report the RSTD measurements from Cell 2 and Cell 3 within 2560 ms starting from the beginning of time interval T2.

In Test 2, the UE shall perform and report the RSTD measurements from Cell 1 and Cell 2, and RSTD measurements from Cell 2 and Cell 3 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement times in the tests are derived from the following expression,

$$T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil,$$

where $M$=8 and $n$=16 for Test 1, and $M$=16 and $n$=16 for Test 2. For Test 1, the $M$ and $n$ parameters specified in Clause 8.1.2.5.1, Table 8.1.2.5.1-1, under Note 1, which gives the total RSTD measurement time of 2560 ms for Cell 3 with respect to the reference cell Cell 2. For Test 2, the $M$ and $n$ parameters are specified in Clause 8.1.2.6.1, Table 8.1.2.6.1-1, under Note 1, which gives the total RSTD measurement time of 4960 ms for reporting the RSTD measurements of Cell 1 and Cell 3 with respect to the reference cell Cell 2.

## A.8.17.2 E-UTRAN TDD RSTD measurement reporting delay test case

### A.8.17.2.1 Test Purpose and Environment

The purpose of the test case is to verify that the RSTD measurements meet the requirements specified in Clause 8.4 in a synchronized network environment with fading propagation conditions. This test case will verify the measurement period requirements specified in Clause 8.4.3 for RSTD measurements performed on the secondary component carrier and also the measurement period requirements for RSTD measurements performed on both the primary and secondary component carriers specified in Clause 8.4.4.

In the tests, there are two configured component carriers: PCC and SCC, and three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is PCell on the PCC, Cell 2 is an active SCell on the SCC, and Cell 3 is a neighbour cell on the SCC. In all tests, Cell 2 is the OTDOA assistance data reference cell.

The test case includes two tests. Test 1 is designed for the scenario where the UE receives OTDOA assistance data with cells on SCC, and the UE is expected to report RSTD measurements performed on SCC only. Test 2 is designed for the scenario where the UE receives OTDOA assistance data with cells on PCC and SCC, and the UE is expected to report RSTD measurements performed on PCC and on SCC.

Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, whilst Cell 2 is active only in T2 and T3, and Cell 3 is active only during T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the OTDOA assistance data reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, while Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.17.2.1-1, Table A.8.17.2.1-2, Table A.8.17.2.1-3 and Table A.8.17.2.1-4.

**Table A.8.17.2.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCell | | Cell 1 | | PCell is on RF channel 1 (PCC). |
| SCell | | Cell 2 | | SCell on RF channel 2 (SCC). Cell 2 is the assistance data reference cell. |
| Other neighbor cell | | Cell 3 | | Neighbor cell on RF channel 2 (SCC). |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | | As specified in clause A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | |
| PRS Transmission Bandwidth | RB | 50 | | PRS are transmitted over the system bandwidth |
| PRS configuration index $I_{PRS}$ | | 174 for all cells on PCC<br>184 for all cells on SCC | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Number of consecutive downlink positioning subframes $N_{PRS}$ | | 1 | | As defined in TS 36.211 [16]. The number of subframes in a positioning occasion |
| Physical cell ID PCI | | (PCI of Cell 2 – PCI of Cell 3)mod6=0 | | The PCI of Cell 1 is selected randomly. PCIs of Cell 2 and Cell 3 are selected randomly such that the relative subcarrier shifts of PRS patterns among these cells are as given by the condition |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |

| | | | | |
|---|---|---|---|---|
| DRX | | ON | | DRX parameters are further specified in Table A.8.17.2.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 2: 1<br>Cell 3 to Cell 2: -1 | | PRS are transmitted from synchronous cells |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | | The value of time alignment error depends upon the type of carrier aggregation. |
| Expected RSTD | µs | Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | Cell 1: -2<br>Cell 3: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Cells in OTDOA assistance data | | 16 cells in total | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24].<br>Cell 1 (when included) appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 3 always appears at random places in the second half of the list. |
| | | OTDOA neighbor cells include Cell 3 and other 14 cells on SCC | OTDOA neighbor cells include Cell 1 and other 7 cells on PCC, and Cell 3 and other 6 cells on SCC | |
| prs-SubframeOffset | | Cells on PCC: 310<br>Cells on SCC, except reference cell: 0 | | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC, except reference cell: 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| PRS muting info | | Cell 1: ‘11110000’<br>Cell 2: ‘00001111’<br>Cell 3: ‘11110000’ | Cell 1: ‘1111111100000000’<br>Cell 2: ‘0000000011111111’<br>Cell 3: ‘1111111100000000’ | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.17.2.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | N/A | N/A |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | N/A | N/A |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 | N/A | N/A |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.17.2.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG patterns defined in A.3.2.2 | | OP.1 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| OCNG_RA Note 1 | | | | | | | |
| OCNG_RB Note 1 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRS_RA | dB | -6 | N/A | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -4 | -Infinity | -Infinity | -1 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -4 | -Infinity | -Infinity | -1 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.94 | N/A | N/A | -66.68 | -70.11 | N/A |
| PRP Note 4 | dBm/ 15 kHz | -102 | -Infinity | -Infinity | -96 | -106 | -Infinity |
| RSRP | dBm/ 15 kHz | -96 | -96 | -105 | -99 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -4 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.17.2.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.17.2.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.4.

In Test 1, the UE shall perform and report the RSTD measurements from Cell 2 and Cell 3 within 2560 ms starting from the beginning of time interval T2.

In Test 2, the UE shall perform and report the RSTD measurements from Cell 1 and Cell 2, and RSTD measurements from Cell 2 and Cell 3 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement times in the tests are derived from the following expression,

$$T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil,$$

where $M$=8 and $n$=16 for Test 1, and $M$=16 and $n$=16 for Test 2. For Test 1, the $M$ and $n$ parameters specified in Clause 8.1.2.5.1, Table 8.1.2.5.1-1, under Note 1, which gives the total RSTD measurement time of 2560 ms for Cell 3 with respect to the reference cell Cell 2. For Test 2, the $M$ and $n$ parameters are specified in Clause 8.1.2.6.1, Table 8.1.2.6.1-1, under Note 1, which gives the total RSTD measurement time of 4960 ms for reporting the RSTD measurements of Cell 1 and Cell 3 with respect to the reference cell Cell 2.

## A.8.17.3 E-UTRAN FDD RSTD Measurement Reporting Test Case for 20 MHz

### A.8.17.3.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.1.1.

The parameters of this test are the same as defined in Subclause A.8.17.1.1 except that the values of the parameters in Table A.8.17.3.1-1, Table A.8.17.3.1-2 and Table A.8.17.3.1-1 will replace the values of the corresponding parameters in Table A.8.17.1.1-1, Table A.8.17.1.1-2 and Table A.8.17.1.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.3.1-1: General test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 FDD | | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | | |
| PRS Transmission Bandwidth | RB | 100 | | PRS are transmitted over the system bandwidth |
| Note 1: See Table A.8.17.1.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.3.1-2: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| OCNG patterns defined in A.3.2.1 | | OP.13 FDD | N/A | N/A |
| Io Note 1 | dBm/ 18 MHz | -64.21 | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-2 for the other parameters. | | | | |

**Table A.8.17.3.1-3: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.1 | | OP.13 FDD | | OP.14 FDD | | OP.14 FDD | N/A |
| Io Note 1 | dBm/ 18 MHz | -66.93 | N/A | N/A | -63.67 | -67.09 | N/A |

| | |
|---|---|
| Note 1: | Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 2: | See Table A.8.17.1.1-3 for the other parameters. |

### A.8.17.3.2 Test Requirements

The test requirements defined in section A.8.17.1.2 shall apply in this test case.

## A.8.17.4 E-UTRAN TDD RSTD Measurement Reporting Test Case for 20 MHz

### A.8.17.4.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.2.1.

The parameters of this test are the same as defined in Subclause A.8.17.2.1 except that the values of the parameters in Table A.8.17.4.1-1, Table A.8.17.4.1-2 and Table A.8.17.4.1-1 will replace the values of the corresponding parameters in Table A.8.17.2.1-1, Table A.8.17.2.1-2 and Table A.8.17.2.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.4.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | | |
| PRS Transmission Bandwidth | RB | 100 | | PRS are transmitted over the system bandwidth |
| Note 1: See Table A.8.17.2.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.4.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| OCNG patterns defined in A.3.2.2 | | OP.7 TDD | N/A | N/A |
| Io Note 1 | dBm/ 18 MHz | -64.21 | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.2.1-2 for the other parameters. | | | | |

**Table A.8.17.4.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.2 | | OP.7 TDD | | OP.8 TDD | | OP.8 TDD | N/A |
| Io Note 1 | dBm/ 18 MHz | -66.93 | N/A | N/A | -63.67 | -67.09 | N/A |

| | |
|---|---|
| Note 1: | Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 2: | See Table A.8.17.2.1-3 for the other parameters. |

### A.8.17.4.2 Test Requirements

The test requirements defined in section A.8.17.2.2 shall apply in this test case.

## A.8.17.5 E-UTRAN FDD RSTD Measurement Reporting Test Case for 10MHz+5MHz

### A.8.17.5.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.1.1.

The parameters of this test are the same as defined in Subclause A.8.17.1.1 except that the values of the parameters in Table A.8.17.5.1-1, Table A.8.17.5.1-2 and Table A.8.17.5.1-1 will replace the values of the corresponding parameters in Table A.8.17.1.1-1, Table A.8.17.1.1-2 and Table A.8.17.1.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.5.1-1: General test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | Cell 1: R.6 FDD<br>Cell 2: R.11 FDD<br>Cell 3: R.11 FDD | Cell 1: R.6 FDD<br>Cell 2: R.11 FDD<br>Cell 3: R.11 FDD | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell 1: 10<br>Cell 2: 5<br>Cell 3: 5 | Cell 1: 10<br>Cell 2: 5<br>Cell 3: 5 | |
| PRS Transmission Bandwidth | RB | Cell 1: 50<br>Cell 2: 25<br>Cell 3: 25 | Cell 1: 50<br>Cell 2: 25<br>Cell 3: 25 | PRS are transmitted over the system bandwidth |
| PRS occasion length $N_{PRS}$ | | Cell 1: 1<br>Cell 2: 2<br>Cell 3: 2 | Cell 1: 1<br>Cell 2: 2<br>Cell 3: 2 | |
| Note 1: See Table A.8.17.1.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.5.1-2: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| Io Note 1 | dBm/ 9 MHz | -67.22 | N/A | N/A |
| | dBm/ 4.5MHz | N/A | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-2 for the other parameters. | | | | |

**Table A.8.17.5.1-3: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG patterns defined in A.3.2.1 | | OP.5 FDD | | OP.19 FDD | | OP.19 FDD | N/A |
| Io Note 1 | dBm/ 9 MHz | -69.94 | N/A | N/A | N/A | N/A | N/A |
| | dBm/ 4.5MHz | N/A | N/A | N/A | -69.69 | -73.12 | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-3 for the other parameters. | | | | | | | |

### A.8.17.5.2 Test Requirements

The test requirements defined in section A.8.17.1.2 shall apply in this test case.

## A.8.17.6 E-UTRAN TDD RSTD Measurement Reporting Test Case for 10MHz+5MHz

### A.8.17.6.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.2.1.

The parameters of this test are the same as defined in Subclause A.8.17.2.1 except that the values of the parameters in Table A.8.17.6.1-1, Table A.8.17.6.1-2 and Table A.8.17.6.1-1 will replace the values of the corresponding parameters in Table A.8.17.2.1-1, Table A.8.17.2.1-2 and Table A.8.17.2.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.6.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | Cell 1: R.6 TDD<br>Cell 2: R.11 TDD<br>Cell 3: R.11 TDD | Cell 1: R.6 TDD<br>Cell 2: R.11 TDD<br>Cell 3: R.11 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell 1: 10<br>Cell 2: 5<br>Cell 3: 5 | Cell 1: 10<br>Cell 2: 5<br>Cell 3: 5 | |
| PRS Transmission Bandwidth | RB | Cell 1: 50<br>Cell 2: 25<br>Cell 3: 25 | Cell 1: 50<br>Cell 2: 25<br>Cell 3: 25 | PRS are transmitted over the system bandwidth |
| PRS occasion length $N_{PRS}$ | | Cell 1: 1<br>Cell 2: 2<br>Cell 3: 2 | Cell 1: 1<br>Cell 2: 2<br>Cell 3: 2 | |
| Note 1: See Table A.8.17.2.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.6.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| Io Note 1 | dBm/ 9 MHz | -67.22 | N/A | N/A |
| | dBm/ 4.5MHz | N/A | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-2 for the other parameters. | | | | |

**Table A.8.17.6.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.1 | | OP.1 TDD | | OP.10 TDD | | OP.10 TDD | N/A |
| Io Note 1 | dBm/ 9 MHz | -69.94 | N/A | N/A | N/A | N/A | N/A |
| | dBm/ 4.5MHz | N/A | N/A | N/A | -69.69 | -73.12 | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-3 for the other parameters. | | | | | | | |

## A.8.17.6.2 Test Requirements

The test requirements defined in section A.8.17.2.2 shall apply in this test case.

# A.8.17.7 E-UTRAN FDD RSTD Measurement Reporting Test Case for 5 + 5 MHz Bandwidth

## A.8.17.7.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.1.1.

The parameters of this test are the same as defined in Subclause A.8.17.1.1 except that the values of the parameters in Table A.8.17.7.1-1, Table A.8.17.7.1-2 and Table A.8.17.7.1-1 will replace the values of the corresponding parameters in Table A.8.17.1.1-1, Table A.8.17.1.1-2 and Table A.8.17.1.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.7.1-1: General test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| PRS Transmission Bandwidth | RB | 25 | | PRS are transmitted over the system bandwidth |
| PRS occasion length $N_{PRS}$ | | 2 | | |
| Note 1: See Table A.8.17.1.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.7.1-2: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| OCNG patterns defined in A.3.2.1 | | OP.18 FDD | N/A | N/A |
| Io Note 1 | dBm/ 4.5 MHz | -70.23 | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-2 for the other parameters. | | | | |

**Table A.8.17.7.1-3: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.1 | | OP.18 FDD | | OP.19 FDD | | OP.19 FDD | N/A |
| Io Note 1 | dBm/ 4.5 MHz | -72.95 | N/A | N/A | -69.69 | -73.12 | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-3 for the other parameters. | | | | | | | |

## A.8.17.7.2 Test Requirements

The test requirements defined in section A.8.17.1.2 shall apply in this test case.

# A.8.17.8 E-UTRAN TDD RSTD Measurement Reporting Test Case for 5+5 MHz bandwidth

## A.8.17.8.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.2.1.

The parameters of this test are the same as defined in Subclause A.8.17.2.1 except that the values of the parameters in Table A.8.17.8.1-1, Table A.8.17.8.1-2 and Table A.8.17.8.1-1 will replace the values of the corresponding parameters in Table A.8.17.2.1-1, Table A.8.17.2.1-2 and Table A.8.17.2.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.8.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 TDD | | As specified in section A.3.1.2.1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | | |
| PRS Transmission Bandwidth | RB | 25 | | PRS are transmitted over the system bandwidth |
| PRS occasion length $N_{PRS}$ | | 2 | | |
| Note 1: See Table A.8.17.2.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.8.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| OCNG patterns defined in A.3.2.1 | | OP.9 TDD | N/A | N/A |
| Io Note 1 | dBm/ 4.5 MHz | -70.23 | N/A | N/A |

| | |
|---|---|
| Note 1: | Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 2: | See Table A.8.17.2.1-2 for the other parameters. |

**Table A.8.17.8.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.1 | | OP.9 TDD | | OP.10 TDD | | OP.10 TDD | N/A |
| Io Note 1 | dBm/ 4.5 MHz | -72.95 | N/A | N/A | -69.69 | -73.12 | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.2.1-3 for the other parameters. | | | | | | | |

## A.8.17.8.2 Test Requirements

The test requirements defined in section A.8.17.2.2 shall apply in this test case.

# A.8.17.9 E-UTRAN TDD RSTD Measurement Reporting Test Case for 20MHz+10MHz

## A.8.17.9.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.8.17.2.1.

The parameters of this test are the same as defined in Subclause A.8.17.2.1 except that the values of the parameters in Table A.8.17.9.1-1, Table A.8.17.9.1-2 and Table A.8.17.9.1-1 will replace the values of the corresponding parameters in Table A.8.17.2.1-1, Table A.8.17.2.1-2 and Table A.8.17.2.1-3, respectively.

Note: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.17.9.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCFICH/PDCCH/PHICH parameters | | Cell 1: R.10 TDD<br>Cell 2: R.6 TDD<br>Cell 3: R.6 TDD | Cell 1: R.10 TDD<br>Cell 2: R.6 TDD<br>Cell 3: R.6 TDD | As specified in section A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell 1: 20<br>Cell 2: 10<br>Cell 3: 10 | Cell 1: 20<br>Cell 2: 10<br>Cell 3: 10 | |
| PRS Transmission Bandwidth | RB | Cell 1: 100<br>Cell 2: 50<br>Cell 3: 50 | Cell 1: 100<br>Cell 2: 50<br>Cell 3: 50 | PRS are transmitted over the system bandwidth |
| Note 1: See Table A.8.17.2.1-1 for the other parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.17.9.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| Io Note 1 | dBm/ 18 MHz | -64.21 | N/A | N/A |

| | | | | |
|---|---|---|---|---|
| | dBm/ 9 MHz | N/A | N/A | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-2 for the other parameters. | | | | |

**Table A.8.17.9.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 |
| OCNG patterns defined in A.3.2.1 | | OP.7 TDD | | OP.2 TDD | | OP.2 TDD | N/A |
| Io Note 1 | dBm/ 18 MHz | -66.93 | N/A | N/A | N/A | N/A | N/A |
| | dBm/ 9MHz | N/A | N/A | N/A | -66.68 | -70.11 | N/A |
| Note 1: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: See Table A.8.17.1.1-3 for the other parameters. | | | | | | | |

### A.8.17.9.2 Test Requirements

The test requirements defined in section A.8.17.2.2 shall apply in this test case.

## A.8.17.10 E-UTRAN 3 DL FDD CA RSTD Measurement Reporting Delay Test Case

### A.8.17.10.1 Test Purpose and Environment

The purpose of the test case is to verify that the RSTD measurements meet the requirements specified in Clause 8.4 in a synchronized network environment with fading propagation conditions. This test case will verify the measurement period requirements specified in Clause 8.4.3 for RSTD measurements performed on the same secondary component carrier, the measurement period requirements for RSTD measurements performed on both the primary and secondary component carriers specified in Clause 8.4.4, and also the measurement period requirements for RSTD measurements performed on different secondary component carriers specified in Clause 8.4.5.

In the tests, there are three configured component carriers: PCC, SCC1 and SCC2, and four synchronous cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the PCC, Cell 2 is SCell on the SCC1, Cell 3 is SCell on the SCC2 and Cell 4 is a neighbour cell on the SCC2. In all tests, Cell 3 is the OTDOA assistance data reference cell.

The test case includes two tests. Test 1 is designed for the scenario where the UE receives OTDOA assistance data with cells only on SCC2, and the UE is expected to report RSTD measurements performed on SCC2 only. Test 2 is designed for the scenario where the UE receives OTDOA assistance data with cells on PCC, SCC1 and SCC2, and the UE is expected to report RSTD measurements performed on PCC, SCC1 and SCC2.

Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, Cell 2 is active only in T2 and T3, Cell 3 is active only during T2 and T3, and Cell 4 is active only during T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the OTDOA assistance data reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T3, and Cell 4 transmits PRS only in T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.17.10.1-1, Table A.8.17.10.1-2, Table A.8.17.10.1-3 and Table A.8.17.10.1-4.

**Table A.8.17.10.1-1: General test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |
| PCell | | Cell 1 | | PCell is on RF channel 1 (PCC). |
| SCell 1 | | Cell 2 | | SCell 1 on RF channel 2 (SCC1). |
| SCell 2 | | Cell 3 | | SCell 2 on RF channel 3 (SCC2). Cell 3 is the assistance data reference cell. |
| Other neighbor cell | | Cell 4 | | Neighbor cell on RF channel 3 (SCC2). |
| PRS configuration index $I_{PRS}$ | | 171 for all cells on PCC<br>181 for all cells on SCC1<br>191 for all cells on SCC2 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Physical cell ID PCI | | (PCI of Cell 3 – PCI of Cell 4)mod6=0 | | The PCIs of Cell 1 and Cell 2 are selected randomly. PCIs of Cell 3 and Cell 4 are selected randomly such that the relative subcarrier shifts of PRS patterns among these cells are as given by the condition |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.17.10.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 3: 1<br>Cell 2 to Cell 3: -1<br>Cell 4 to Cell 3: 3 | | PRS are transmitted from synchronous cells |
| Time alignment errors between cell1, cell2 and cell3 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | | The value of time alignment error depends upon the type of carrier aggregation. |
| Expected RSTD | µs | Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | Cell 1: -2<br>Cell 2: 0<br>Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Cells in OTDOA assistance data | | 16 cells in total | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. Cell 1 and Cell 2 (when included) appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 4 always appears at random places in the second half of the list. |
| | | OTDOA neighbor cells include Cell 4 and other 14 cells on SCC2 | OTDOA neighbor cells include Cell 1 and other 3 cells on PCC, Cell 2 and other 3 cells on SCC1 and Cell 4 and other 6 cells on SCC2 | |
| ‘prs-SubframeOffset | | Cells on PCC: 300<br>Cells on SCC1: 310<br>Cells on SCC2, except reference cell: 0 | | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |

| | | | | |
|---|---|---|---|---|
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC1: 0<br>Cells on SCC2, except reference cell: 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000'<br>Cell 4: '00001111' | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000'<br>Cell 4: 0000000011111111' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.17.10.1-2: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | N/A | N/A | N/A |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | N/A | N/A | N/A |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | N/A | N/A | N/A |
| OCNG patterns defined in A.3.2.1 | | 5MHz: OP.18 FDD<br>10MHz: OP.5 FDD<br>20MHz: OP.13 FDD | N/A | N/A | N/A |
| PBCH_RA | dB | 0 | N/A | N/A | N/A |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA Note 1 | | | | | |
| OCNG_RB Note 1 | | | | | |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | N/A | N/A | N/A |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity | -Infinity |

| | | | | | |
|---|---|---|---|---|---|
| Io Note 4 | dBm/ 9 MHz | -67.22 +10log ($N_{RB,c}$ /50) | N/A | N/A | N/A |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.17.10.1-3: Cell-specific test parameters for E-UTRAN FDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | 3 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | | 5,10,20 | | 5,10,20 | | 5,10,20 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | N/A |
| OCNG patterns defined in A.3.2.1 (There is no PDSCH allocated in the subframe transmitting PRS) | | 5MHz: OP.18 FDD 10MHz: OP.5 FDD 20MHz: OP.13 FDD | | 5MHz: OP.19 FDD 10MHz: OP.6 FDD 20MHz: OP.14 FDD | | 5MHz: OP.19 FDD 10MHz: OP.6 FDD 20MHz: OP.14 FDD | | 5MHz: OP.19 FDD 10MHz: OP.6 FDD 20MHz: OP.14 FDD | N/A |
| PRS Transmission Bandwidth (PRS transmission bandwidth depends on selected channel bandwidth. PRS are transmitted over the system bandwidth) | RB | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | N/A |
| Number of consecutive downlink positioning subframes $N_{PRS}$. $N_{PRS}$ also depends on selected channel bandwidth. As defined in TS 36.211 [16]. The number of subframes in a positioning occasion | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | N/A |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | N/A |
| PBCH_RB | | | | | | | | | |
| PSS_RA | | | | | | | | | |
| SSS_RA | | | | | | | | | |
| PCFICH_RB | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | | | | | |
| PRS_RA | dB | -6 | N/A | N/A | 3 | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -4 | -Infinity | -Infinity | -1 | -Infinity | -1 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -4 | -Infinity | -Infinity | -1 | -Infinity | -1 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.94 +10log ($N_{RB,c}$ /50) | N/A | N/A | -66.68 +10log ($N_{RB,c}$ /50) | N/A | -66.68 +10log ($N_{RB,c}$ /50) | -70.11 +10log ($N_{RB,c}$ /50) | N/A |
| PRP Note 4 | dBm/ 15 kHz | -102 | -Infinity | -Infinity | -96 | -Infinity | -96 | -106 | -Infinity |
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -99 | -105 | -99 | -109 | -Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -4 | -7 | -4 | -11 | -Infinity |
| Propagation Condition | | ETU30 | | | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.17.10.1-4: DRX parameters for the test of E-UTRAN FDD intra-frequency RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.17.10.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.4.

In Test 1, the UE shall perform and report the RSTD measurements from Cell 4 and Cell 3 within 2560 ms starting from the beginning of time interval T2.

In Test 2, the UE shall perform and report the RSTD measurements from Cell 1 and Cell 3, RSTD measurements from Cell 2 and Cell 3, and RSTD measurements from Cell 4 and Cell 3 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement times in the tests are derived from the following expression,

$$T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil,$$

where $M$=8 and $r_i$=16 for Test 1, and $M$=16 and $r_i$=16 for Test 2. For Test 1, the $M$ and $r_i$ parameters specified in Clause 8.1.2.5.1, Table 8.1.2.5.1-1, under Note 1, which gives the total RSTD measurement time of 2560 ms for Cell 4 with respect to the reference cell Cell 3. For Test 2, the $M$ and $r_i$ parameters are specified in Clause 8.1.2.6.1, Table 8.1.2.6.1-1, under Note 1, which gives the total RSTD measurement time of 4960 ms for reporting the RSTD measurements of Cell 1, Cell 2 and Cell 4 with respect to the reference cell Cell 3.

## A.8.17.11 E-UTRAN 3 DL TDD CA RSTD Measurement Reporting Delay Test Case

### A.8.17.11.1 Test Purpose and Environment

The purpose of the test case is to verify that the RSTD measurements meet the requirements specified in Clause 8.4 in a synchronized network environment with fading propagation conditions. This test case will verify the measurement period requirements specified in Clause 8.4.3 for RSTD measurements performed on the same secondary component carrier, the measurement period requirements for RSTD measurements performed on both the primary and secondary component carriers specified in Clause 8.4.4, and also the measurement period requirements for RSTD measurements performed on different secondary component carriers specified in Clause 8.4.5.

In the tests, there are three configured component carriers: PCC, SCC1 and SCC2, and four synchronous cells: Cell 1, Cell 2, Cell 3 and Cell 4. Cell 1 is PCell on the PCC, Cell 2 is SCell on the SCC1, Cell 3 is SCell on the SCC2 and Cell 4 is a neighbour cell on the SCC2. In all tests, Cell 3 is the OTDOA assistance data reference cell.

The test case includes two tests. Test 1 is designed for the scenario where the UE receives OTDOA assistance data with cells only on SCC2, and the UE is expected to report RSTD measurements performed on SCC2 only. Test 2 is designed for the scenario where the UE receives OTDOA assistance data with cells on PCC, SCC1 and SCC2, and the UE is expected to report RSTD measurements performed on PCC, SCC1 and SCC2.

Each test consists of three consecutive time intervals, with duration of T1, T2 and T3. Cell 1 is active in T1, T2 and T3, Cell 2 is active only in T2 and T3, Cell 3 is active only during T2 and T3, and Cell 4 is active only during T2. The beginning of the time interval T2 shall be aligned with the first PRS positioning subframe of a positioning occasion in the OTDOA assistance data reference cell, where the PRS positioning occasion is as defined in Clause 8.1.2.5.1. Cell 1 transmits PRS in T2, Cell 2 transmits PRS only in T3, and Cell 3 transmits PRS only in T3, and Cell 4 transmits PRS only in T2.

Note: The information on when PRS is muted is conveyed to the UE using PRS muting information.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE during T1. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of T2, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

The test parameters are as given in Table A.8.17.11.1-1, Table A.8.17.11.1-2, Table A.8.17.11.1-3 and Table A.8.17.11.1-4.

**Table A.8.17.11.1-1: General test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test 1 | Test 2 | |

| | | | | |
|---|---|---|---|---|
| PCell | | Cell 1 | | PCell is on RF channel 1 (PCC). |
| SCell 1 | | Cell 2 | | SCell 1 on RF channel 2 (SCC1). |
| SCell 2 | | Cell 3 | | SCell 2 on RF channel 3 (SCC2). Cell 3 is the assistance data reference cell. |
| Other neighbor cell | | Cell 4 | | Neighbor cell on RF channel 3 (SCC2). |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5MHz or 10MHz or 20MHz | | All channels in a test have the same bandwidth. |
| PRS configuration index $I_{PRS}$ | | 174 for all cells on PCC<br>184 for all cells on SCC1<br>194 for all cells on SCC2 | | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS} - 160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| Physical cell ID PCI | | (PCI of Cell 3 – PCI of Cell 4)mod6=0 | | The PCIs of Cell 1 and Cell 2 are selected randomly. PCIs of Cell 3 and Cell 4 are selected randomly such that the relative subcarrier shifts of PRS patterns among these cells are as given by the condition |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760 \cdot T_s$ and UpPTS of $4384 \cdot T_s$ |
| CP length | | Normal | | |
| DRX | | ON | | DRX parameters are further specified in Table A.8.17.11.1-3 |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 3: 1<br>Cell 2 to Cell 3: -1<br>Cell 4 to Cell 3: 3 | | PRS are transmitted from synchronous cells |
| Time alignment errors among cell1, cell2 and cell3 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | | The value of time alignment error depends upon the type of carrier aggregation. |
| Expected RSTD | µs | Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | Cell 1: -2<br>Cell 2: 0<br>Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Cells in OTDOA assistance data | | 16 cells in total | | The list includes the reference cell (received in *OTDOA-* |

| | | | | |
|---|---|---|---|---|
| | | OTDOA neighbor cells include Cell 4 and other 14 cells on SCC2 | OTDOA neighbor cells include Cell 1 and other 3 cells on PCC, Cell 2 and other 3 cells on SCC1 and Cell 4 and other 6 cells on SCC2 | *ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. Cell 1 and Cell 2 (when included) appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 4 always appears at random places in the second half of the list. |
| prs-SubframeOffset | | Cells on PCC: 300<br>Cells on SCC1: 310<br>Cells on SCC2, except reference cell: 0 | | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC1: 0<br>Cells on SCC2, except reference cell: 0 | | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| PRS muting info | | Cell 1: '11110000'<br>Cell 2: '00001111'<br>Cell 3: '11110000'<br>Cell 4: '00001111' | Cell 1: '1111111100000000'<br>Cell 2: '0000000011111111'<br>Cell 3: '1111111100000000'<br>Cell 4: '0000000011111111' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| T1 | s | 3 | | The length of the time interval from the beginning of each test |
| T2 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T1 |
| T3 | s | 1.28 | 2.48 | The length of the time interval that follows immediately after time interval T2 |

**Table A.8.17.11.1-2: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T1 for carrier aggregation**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | N/A | N/A | N/A |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | N/A | N/A | N/A |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low | 1x2 Low |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R11 TDD<br>10MHz: R6 TDD<br>20MHz: R10 TDD | N/A | N/A | N/A |
| OCNG patterns defined in A.3.2.2 | | 5MHz: OP.10 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | N/A | N/A | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | N/A | N/A | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -95 | N/A | N/A | N/A |
| PRS $\hat{E}_s/N_{oc}$ | dB | -Infinity | -Infinity | -Infinity | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -67.22 +10log ($N_{RB,c}$ /50) | N/A | N/A | N/A |
| $\hat{E}_s/N_{oc}$ | dB | 0 | -Infinity | -Infinity | -Infinity |
| Propagation Condition | | ETU30 | | | |

Note 1: OCNG shall be used such that active cell (Cell 1) is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Io levels have been derived from other parameters and are given for information purpose. These are not settable test parameters.

**Table A.8.17.11.1-3: Cell-specific test parameters for E-UTRAN TDD RSTD measurement reporting delay under fading propagation conditions during T2 and T3 for carrier aggregation**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T2 | T3 | T2 | T3 | T2 | T3 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | 3 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | | 5,10,20 | | 5,10,20 | | 5,10,20 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R11 TDD 10MHz: R6 TDD 20MHz: R10 TDD | | 5MHz: R11 TDD 10MHz: R6 TDD 20MHz: R10 TDD | | 5MHz: R11 TDD 10MHz: R6 TDD 20MHz: R10 TDD | | 5MHz: R11 TDD 10MHz: R6 TDD 20MHz: R10 TDD | N/A |
| OCNG patterns defined in A.3.2.1 | | 5MHz: OP.10 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | 5MHz: OP.10 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | 5MHz: OP.10 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | | 5MHz: OP.10 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | N/A |
| PRS Transmission Bandwidth (PRS transmission bandwidth depends on selected channel bandwidth. PRS are transmitted over the system bandwidth) | RB | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | | 5MHz: 25 10MHz: 50 20MHz:100 | N/A |
| Number of consecutive downlink positioning subframes $N_{PRS}$. $N_{PRS}$ also depends on selected channel bandwidth. As defined in TS 36.211 [16]. The number of subframes in a positioning occasion | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | | 5MHz: 2 10MHz: 1 20MHz:1 | N/A |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | 0 | | 0 | | 0 | N/A |
| PRS_RA | dB | -6 | N/A | N/A | 3 | N/A | 3 | 3 | N/A |
| $N_{oc}$ Note 3 | dBm/ 15 kHz | -98 | -98 | -98 | -95 | -98 | -95 | -98 | -95 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -4 | -Infinity | -Infinity | -1 | -Infinity | -1 | -8 | -Infinity |
| PRS $\hat{E}_s/I_{ot}$ Note 4 | dB | -4 | -Infinity | -Infinity | -1 | -Infinity | -1 | -8 | -Infinity |
| Io Note 4 | dBm/ 9 MHz | -69.94 +10log ($N_{RB,c}$ /50) | N/A | N/A | -66.68 +10log ($N_{RB,c}$ /50) | N/A | -66.68 +10log ($N_{RB,c}$ /50) | -70.11 +10log ($N_{RB,c}$ /50) | N/A |
| PRP Note 4 | dBm/ 15 kHz | -102 | -Infinity | -Infinity | -96 | -Infinity | -96 | -106 | -Infinity |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RSRP Note 4 | dBm/ 15 kHz | -96 | -96 | -105 | -99 | -105 | -99 | -109 | - Infinity |
| $\hat{E}_s/N_{oc}$ Note 4 | dB | 2 | 2 | -7 | -4 | -7 | -4 | -11 | - Infinity |
| Propagation Condition | | ETU30 | | | | | | | |

Note 1: OCNG shall be used such that active cells (all, except Cell 3 in T3) are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted PRS.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: If PRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters and are given for information purpose. If PRS_RA is "N/A", Io and RSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.8.17.11.1-4: DRX parameters for the test of E-UTRAN TDD intra-frequency RSTD measurement reporting delay under fading propagation conditions for carrier aggregation**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in TS 36.331 [2], Clause 6.3.2 |
| Drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | sf1 | |
| longDRX-CycleStartOffset | sf320 | |
| shortDRX | Disable | |

## A.8.17.11.2 Test Requirements

The RSTD measurement time fulfils the requirements specified in Clause 8.4.

In Test 1, the UE shall perform and report the RSTD measurements from Cell 4 and Cell 3 within 2560 ms starting from the beginning of time interval T2.

In Test 2, the UE shall perform and report the RSTD measurements from Cell 1 and Cell 3, RSTD measurements from Cell 2 and Cell 3, and RSTD measurements from Cell 4 and Cell 3 within 4960 ms starting from the beginning of time interval T2.

The rate of the correct events for each neighbour cell observed during repeated tests shall be at least 90%, where the reported RSTD measurement for each correct event shall be within the RSTD reporting range specified in Clause 9.1.10.3, i.e., between RSTD_0000 and RSTD_12711.

NOTE: The RSTD measurement times in the tests are derived from the following expression,

$$T_{PRS}(M-1)+160\left\lceil \frac{n}{M} \right\rceil,$$

where $M$=8 and $n$=16 for Test 1, and $M$=16 and $n$=16 for Test 2. For Test 1, the $M$ and $n$ parameters specified in Clause 8.1.2.5.1, Table 8.1.2.5.1-1, under Note 1, which gives the total RSTD measurement time of 2560 ms for Cell 4 with respect to the reference cell Cell 3. For Test 2, the $M$ and $n$ parameters are specified in Clause 8.1.2.6.1, Table 8.1.2.6.1-1, under Note 1, which gives the total RSTD measurement time of 4960 ms for reporting the RSTD measurements of Cell 1, Cell 2 and Cell 4 with respect to the reference cell Cell 3.

# A.8.18 E-UTRAN TDD – HRPD Measurements

## A.8.18.1 E-UTRAN TDD-HRPD event triggered reporting under fading propagation conditions

### A.8.18.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN TDD- HRPD cell search requirements in clause 8.1.2.4.12.

The test parameters are given in Tables A.8.18.1.1-1, A.8.18.1.1-2 and A.8.18.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.18.1.1-1: General test parameters for E-UTRAN TDD to HRPD event triggered reporting under fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Active cell | | Cell 1 | E-UTRAN TDD cell |
| Neighbouring cell | | Cell 2 | HRPD cell |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| E-UTRAN TDD measurement quantity | | RSRP | |
| Inter-RAT (HRPD) measurement quantity | | CDMA2000 HRPD Pilot Strength | |
| b1-ThresholdCDMA2000 | dB | -7 | Absolute ‘CDMA2000 HRPD Pilot Strength’ threshold for event B1 |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | Non-DRX test |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| HRPD RF Channel Number | | 1 | One HRPD carrier frequency is used. |
| HRPD neighbour cell list size | | 8 | HRPD cells on HRPD RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | s | 5 | |
| T2 | s | 3 | |

**Table A.8.18.1.1-2: Cell specific test parameters for E-UTRAN TDD cell#1 for event triggered reporting under fading propagation conditions**

| Parameter | Unit | Cell 1 (E-UTRA) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |
| OCNG Patterns defined in TS36.133 A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 KHz | -98 | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 0 | 0 |
| $\hat{E}_s / I_{ot}$ | dB | 0 | 0 |
| Propagation Condition | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.18.1.1-3: Cell specific test parameters for HRPD (cell # 2) for event triggered reporting under fading propagation conditions**

| Parameter | Unit | Cell 2 (HRPD) | |
|---|---|---|---|
| | | T1 | T2 |
| $\frac{\text{Control } E_b}{N_t}$ (38.4 kbps) | dB | 21 | |
| $\frac{\text{Control } E_b}{N_t}$ (76.8 kbps) | dB | 18 | |
| $\hat{I}_{or} / I_{oc}$ | dB | -infinity | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | |
| CDMA2000 HRPD Pilot Strength | dB | -infinity | -3 |
| Propagation Condition | | ETU70 | |

## A.8.18.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 2134 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.19 E-UTRAN TDD – CDMA2000 1X Measurements

## A.8.19.1 E-UTRAN TDD – CDMA2000 1X event triggered reporting under fading propagation conditions

### A.8.19.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN TDD- CDMA2000 1X cell search requirements in clause 8.1.2.4.10.

The test parameters are given in Tables A.8.19.1.1-1, A.8.19.1.1-2 and A.8.19.1.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.19.1.1-1: General test parameters for E-UTRAN TDD-CDMA2000 1X event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on CDMA2000 1X RF channel number 1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. Applicable to cell 1. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. Applicable to cell 1. |
| CP length | | Normal | Applicable to cell 1. |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| CDMA2000 1X Channel Number | | 1 | One CDMA2000 1X carrier frequency is used. |
| Inter-RAT (CDMA2000 1X) measurement quantity | | CDMA2000 1xRTT Pilot Strength | |
| B1-Threshold-CDMA2000 | dB | -14 | Absolute 'CDMA2000 1xRTT Pilot Strength' threshold for event B1 |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| cdma2000 1X neighbour cell list size | | 8 | cdma2000 1X cells on cdma2000 1X RF channel 1 provided in the cell list before T2. |
| cdma2000-SearchWindowSize | | 8 (60 PN chips) | Search window size as defined in clause 6.3.5 in TS 36.331 |
| T1 | s | 5 | |
| T2 | s | 3 | |

**Table A.8.19.1.1-2: Cell specific test parameters for E-UTRAN TDD (cell # 1) for event triggered reporting of CDMA2000 1X cell under fading propagation conditions**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | |

| | | | |
|---|---|---|---|
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| RSRP | dBm/15 kHz | -94 | -94 |
| SCH_RP | dBm/15 kHz | -94 | -94 |
| Propagation Condition | | ETU70 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | |
| Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | |

**Table A.8.19.1.1-3: Cell specific test parameters for CDMA2000 1X (cell # 2) for event triggered reporting of CDMA2000 1X cell under fading propagation conditions**

| Parameter | Unit | Cell 2 (cdma2000 1X) | |
|---|---|---|---|
| | | T1 | T2 |
| $\frac{\text{Pilot } E_c}{I_{or}}$ | dB | -7 | |
| $\frac{\text{Sync } E_c}{I_{or}}$ | dB | -16 | |
| $\frac{\text{Paging } E_c}{I_{or}}$ (4.8 kbps) | dB | -12 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -infinity | 0 |
| $I_{oc}$ | dBm/1.2288 MHz | -55 | |
| CDMA2000 1xRTT Pilot Strength | dB | -infinity | -10 |
| Propagation Condition | | ETU70 | |

## A.8.19.1.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 2134 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.20 Inter-frequency/RAT Measurements in CA mode

## A.8.20.1 E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells

It is not necessary for CA UEs to be tested in A.8.3.1 if this case is done.

### A.8.20.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD-FDD inter-frequency cell search requirements in clause 8.1.2.3.

The test parameters are given in Tables A.8.20.1.1-1 and A.8.20.1.1-2. In this test, there are three cells on different carrier frequencies and gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.1.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| E-UTRA RF Channel Number for Scell | | 3 | One FDD carrier frequencies is used |
| Channel Bandwidth (BWchannel) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Configured active Scell | | Cell 3 | Cell 3 is on RF channel number 3 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Cell2 timing offset to cell1 | ms | 3 | Asynchronous cells |
| Cell3 timing offset to cell1 | µs | 0 | Synchronous cells |
| Time alignment error between cell3 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.20.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | | OP.1 FDD | |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 | -94 | -94 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 | 4 | 4 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 | -94 | -94 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 | 4 | 4 |
| Propagation Condition | | ETU70 | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.20.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 3840 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.20.2 E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells

It is not necessary for CA UEs to be tested in A.8.4.1 if this case is done.

### A.8.20.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD-TDD inter-frequency cell search requirements in clause 8.1.2.3.4.

The test parameters are given in Table A.8.20.2.1-1 and A.8.20.2.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.2.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| E-UTRA RF Channel Number for Scell | | 3 | One TDD carrier frequencies is used |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Configured active Scell | | Cell 3 | Cell 3 is on RF channel number 3 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Cell2 timing offset to cell1 | µs | 3 | Synchronous cells |
| Cell3 timing offset to cell1 | µs | 0 | Synchronous cells |
| Time alignment error between cell3 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.20.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2) | | OP.1 TDD | | OP.2 TDD | | OP.1 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | -Infinity | 7 | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | | | | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -Infinity | -91 | -94 | -94 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -infinity | -91 | -94 | -94 |
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | -Infinity | 7 | 4 | 4 |
| Propagation Condition | | ETU70 | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.20.2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 7680 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.20.2A E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +20 MHz bandwidth.

## A.8.20.2A.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.20.2. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8.20.2A.1-1 and A.8.20.2A.1-2 will replace the values of corresponding parameters in Tables A.8.20.2.1-1 and A.8.20.2.1-2.

**Table A.8.20.2A.1-1: General test parameters for E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +20 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | As specified in clause A.3.1.2.2 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | |
| Note 1: See Table A.8.20.2.1-1 for other general test parameters.<br>Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.20.2A.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +20 MHz bandwidth**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 20 | | 20 | |
| OCNG Pattern defined in A.3.2.2 | | OP.7 TDD | | OP.8 TDD | | OP.7 TDD | |
| Note 1: See Table A.8.20.2.1-1 for other general test parameters. | | | | | | | |

## A.8.20.2A.2 Test Requirements

The test requirements defined in section A.8.20.2.2 shall apply to this test case.

# A.8.20.2B E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +10 MHz bandwidth.

## A.8.20.2B.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.8.20.2.

The test parameters given in Tables A.8.20.2B.1-1 and A.8.20.2B.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.2B.1-1: General test parameters for E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +10 MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |

| | | | |
|---|---|---|---|
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| CP length | | Normal | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| E-UTRA RF Channel Number for Scell | | 3 | One TDD carrier frequencies is used |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Configured active Scell | | Cell 3 | Cell 3 is on RF channel number 3 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Cell2 timing offset to cell1 | µs | 3 | Synchronous cells |
| Cell3 timing offset to cell1 | µs | 0 | Synchronous cells |
| Time alignment error between cell3 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| T1 | s | 5 | |
| T2 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.20.2B.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +10 MHz bandwidth**

| Parameter | Unit | Combination | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | All | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 20MHz+10MHz | 20MHz: $N_{RB,c}$ = 100 | | 10MHz: $N_{RB,c}$ = 50 | | 10MHz: $N_{RB,c}$ = 50 | |
| | | 10MHz+20MHz | 10MHz: $N_{RB,c}$ = 50 | | 20MHz: $N_{RB,c}$ = 100 | | 20MHz: $N_{RB,c}$ = 100 | |
| Correlation Matrix and Antenna Configuration | | All | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 20MHz+10MHz | DL Reference Measurement Channel R.3 TDD | | N/A | | DL Reference Measurement Channel R.0 TDD | |
| | | 10MHz+20MHz | DL Reference Measurement Channel R.0 TDD | | N/A | | DL Reference Measurement Channel R.3 TDD | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 20MHz+10MHz | DL Reference Measurement Channel R.10 TDD | | DL Reference Measurement Channel R.6 TDD | | DL Reference Measurement Channel R.6 TDD | |
| | | 10MHz+20MHz | DL Reference Measurement Channel R.6 TDD | | DL Reference Measurement Channel R.10 TDD | | DL Reference Measurement Channel R.10 TDD | |
| OCNG Pattern defined in A.3.2.2 (TDD) | | 20MHz+10MHz | OP.7 TDD | | OP.2 TDD | | OP.1 TDD | |
| | | 10MHz+20MHz | OP.1 TDD | | OP.8 TDD | | OP.7 TDD | |
| PBCH_RA | dB | All | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |
| PCFICH_RB | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDCCH_RA | dB | | | | | | | |
| PDCCH_RB | dB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $\hat{E}_s/I_{ot}$ | dB | All | 4 | 4 | -Infinity | 7 | 4 | 4 |
| $N_{oc}$ Note 3 | dBm/15 kHz | All | -98 | | -98 | | -98 | |
| RSRP Note 4 | dBm/15 kHz | All | -94 | -94 | -Infinity | -91 | -94 | -94 |
| SCH_RP Note 4 | dBm/15 kHz | All | -94 | -94 | -infinity | -91 | -94 | -94 |
| $\hat{E}_s/N_{oc}$ | dB | All | 4 | 4 | -Infinity | 7 | 4 | 4 |
| Propagation Condition | | All | ETU70 | | ETU70 | | ETU70 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE priori to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.20.2B.2 Test Requirements

The test requirements defined in section A.8.20.2.2 shall apply to this test case.

## A.8.20.3 E-UTRAN FDD - UTRAN FDD event triggered reporting under fading propagation conditions

It is not necessary for CA UEs to be tested in A.8.5.1 if this case is done.

### A.8.20.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRAN FDD- UTRAN FDD cell search requirements in clause 8.1.2.4.1.

The test parameters are given in Tables A.8.20.3.1-1, A.8.20.3.1-2 and A.8.20.3.1-3 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.3.1-1: General test parameters for E-UTRAN FDD-UTRAN FDD event triggered reporting in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 | Cell 2 is on UTRA RF channel number 1. |
| Configured active Scell | | Cell 3 | Cell 3 is on E-UTRA RF channel number 2. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| E-UTRA RF Channel Number for Scell | | 2 | One E-UTRA FDD carrier frequency is used. |

| | | | |
|---|---|---|---|
| E-UTRA Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| UTRA RF Channel Number | | 1 | One UTRA FDD carrier frequency is used. |
| Inter-RAT (UTRA FDD) measurement quantity | | CPICH Ec/Io | |
| b1-Threshold-UTRA | dB | -18 | CPICH Ec/Io threshold for event B1. |
| Hysteresis | dB | 0 | |
| Time To Trigger | ms | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used. |
| DRX | | OFF | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| T1 | s | 5 | |
| T2 | s | 6 | |

**Table A.8.20.3.1-2: Cell specific test parameters for E-UTRAN FDD (cell # 1, cell # 3) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 1 | | Cell 3 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | | OP.1 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |
| OCNG_RB[Note 1] | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | |
| $N_{oc}$ | dBm/15 kHz | -98 | | | |
| RSRP | dBm/15 kHz | -94 | -94 | -94 | |
| SCH_RP | dBm/15 kHz | -94 | -94 | -94 | |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.20.3.1-3: Cell specific test parameters for UTRAN FDD (cell # 2) for event triggered reporting of UTRAN FDD cell under fading propagation conditions**

| Parameter | Unit | Cell 2 | |
|---|---|---|---|
| | | T1 | T2 |

| | | | |
|---|---|---|---|
| UTRA RF Channel Number | | 1 | |
| CPICH_Ec/Ior | dB | -10 | |
| PCCPCH_Ec/Ior | dB | -12 | |
| SCH_Ec/Ior | dB | -12 | |
| PICH_Ec/Ior | dB | -15 | |
| DPCH_Ec/Ior | dB | N/A | |
| OCNS | | -0.941 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -Infinity | -1.8 |
| $I_{oc}$ | dBm/3.84 MHz | -70 | |
| CPICH_Ec/Io | dB | -Infinity | -14 |
| Propagation Condition | | Case 5 (Note 3) | |
| Note 1: The DPCH level is controlled by the power control loop. | | | |
| Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$ | | | |
| Note3: Case 5 propagation conditions are defined in Annex A of 3GPP TS 25.101. | | | |

### A.8.20.3.2 Test Requirements

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 4800 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.20.4 E-UTRAN TDD to UTRAN TDD cell search under fading propagation conditions

It is not necessary for CA UEs to be tested in A.8.7.1 if this case is done.

### A.8.20.4.1 Test Purpose and Environment

#### A.8.20.4.1.1 1.28 Mcps TDD option

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the E-UTRA TDD to UTRA TDD cell search requirements in clause 8.1.2.4.3 under fading propagation conditions.

This test scenario comprised of 1 E-UTRA TDD PCell, 1 E-UTRA TDD SCell and 1 UTRA TDD cell to be searched. Test parameters are given in Table A.8.20.4.1.2-1, A.8.20.4.1.2-2, and A.8.20.4.1.2-3. Gap pattern configuration #0 as defined in table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.4.1.1-1: General test parameters for E-UTRA TDD to UTRA(1.28 Mcps TDD OPTION) cell search in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA RF Channel Number for Scell | | 2 | One E-UTRA TDD carrier frequency is used. |
| Active cell | | Cell 1 | E-UTRA TDD cell |
| Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Configured active SCell | | Cell 3 | E-UTRA TDD cell |

| | | | |
|---|---|---|---|
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | normal | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 ms | Asynchronous cells |
| Ofn | dB | 0 | |
| Thresh | dBm | -87 | |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.20.4.1.1-2: Cell specific test parameters for cell search E-UTRA TDD to UTRA TDD test case (cell 1, cell3)**

| Parameter | Unit | Cell 1 | | Cell 3 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Pattern defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | | OP.1 TDD | |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note1 | dB | | | | |
| OCNG_RB Note1 | dB | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 9 | 9 | 9 | 9 |
| $\hat{E}_s / N_{oc}$ | dB | 9 | 9 | 9 | 9 |
| $N_{oc}$ | dBm/15kHz | -98 | | | |
| RSRP | dBm/15kHz | -89 | -89 | -89 | -89 |
| SCH_RP | dBm/15kHz | -89 | -89 | -89 | -89 |
| Propagation Condition | | ETU70 | | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

**Table A.8.20.4.1.1-3: Cell specific test parameters for cell search E-UTRA TDD to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number NOTE1 | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior NOTE2 | dB | -3 | -3 | | |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{I}_{or}/I_{oc}$ | dB | -inf | 5 | -inf | 5 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -inf | -78 | n.a. | n.a. |
| Propagation Condition | | Case 3 NOTE3 | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number. | | | | | |
| Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$. | | | | | |
| Note 3: Case 3 propagation conditions are defined in Annex B of TS 25.102 | | | | | |

### A.8.20.4.2 Test Requirements

#### A.8.20.4.2.1 1.28 Mcps TDD option

The UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.20.4A E-UTRAN TDD with 20 MHz +20 MHz bandwidth to UTRAN TDD cell search under fading propagation conditions

### A.8.20.4A.1 Test Purpose and Environment

#### A.8.20.4A.1.1 1.28 Mcps TDD option

The purpose of this test case is the same as for the test defined in subclause A.8.20.4. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.8. 20.4A.1.1-1 and A.8. 20.4A.1.1-2 will replace the values of corresponding parameters in Tables A.8. 20.4.1.1-1 and A.8. 20.4.1.1-2.

**Table A.8.20.4A.1.1-1: General test parameters for E-UTRA TDD with 20MHz +20MHz bandwidth to UTRA(1.28 Mcps TDD OPTION) cell search in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.3 TDD | As specified in section A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.10 TDD | As specified in section A.3.1.2.2 |
| Note 1: See Table A.8.20.4.1.1-1 for other general test parameters. | | | |
| Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.20.4A.1.1-2: Cell specific test parameters for cell search E-UTRA TDD with 20MHz +20MHz bandwidth to UTRA TDD test case (cell 1, cell3)**

| Parameter | Unit | Cell 1 | | Cell 3 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 20 | | 20 | |
| OCNG Pattern defined in A.3.2.2 | | OP.7 TDD | | OP.7 TDD | |
| Propagation Condition | | ETU70 | | | |
| Note 1: See Table A.8.20.4.1.1-2 for other general test parameters. | | | | | |
| Note 2: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |

### A.8.20.4A.2 Test Requirements

#### A.8.20.4A.2.1 1.28 Mcps TDD option

The test requirements defined in section A.8.20.4.2.1 shall apply to this test case.

## A.8.20.4B E-UTRAN TDD with 20 MHz +10 MHz bandwidth to UTRAN TDD cell search under fading propagation conditions

### A.8.20.4B.1 Test Purpose and Environment

#### A.8.20.4B.1.1 1.28 Mcps TDD option

The purpose of this test case is the same as for the test defined in subclause A.8.20.4.

This test scenario comprised of 1 E-UTRA TDD PCell, 1 E-UTRA TDD SCell and 1 UTRA TDD cell to be searched. The test parameters are given in Tables A.8. 20.4B.1.1-1, A.8. 20.4B.1.1-2 and A.8.20.4B.1.1-3. Gap pattern configuration #0 as defined in table 8.1.2.1-1 is provided.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.20.4B.1.1-1: General test parameters for E-UTRA TDD with 20MHz +10MHz bandwidth to UTRA(1.28 Mcps TDD OPTION) cell search in fading propagation conditions**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | One E-UTRA TDD carrier frequency is used. |
| E-UTRA RF Channel Number for Scell | | 2 | One E-UTRA TDD carrier frequency is used. |
| Active cell | | Cell 1 | E-UTRA TDD cell |
| Neighbour cell | | Cell 2 | UTRA 1.28Mcps TDD Cell |
| Configured active SCell | | Cell 3 | E-UTRA TDD cell |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | normal | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | | 3 ms | Asynchronous cells |
| Ofn | dB | 0 | |
| Thresh | dBm | -87 | |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.20.4B.1.1-2: Cell specific test parameters for cell search E-UTRA TDD with 20MHz +10MHz bandwidth to UTRA TDD test case (cell 1, cell3)**

| Parameter | Unit | Combination | Cell 1 | | Cell 3 | |
|---|---|---|---|---|---|---|
| | | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | All | 1 | | 2 | |
| $BW_{channel}$ | | 20MHz+10MHz | 20 | | 10 | |
| | | 10MHz+20MHz | 10 | | 20 | |
| Correlation Matrix and Antenna Configuration | | All | 1x2 Low | | 1x2 Low | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 20MHz+10MHz | R.3 TDD | | R.0 TDD | |
| | | 10MHz+20MHz | R.0 TDD | | R.3 TDD | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 20MHz+10MHz | R.10 TDD | | R.6 TDD | |
| | | 10MHz+20MHz | R.6 TDD | | R.10 TDD | |
| OCNG Pattern defined in A.3.2.2 | | 20MHz+10MHz | OP.7 TDD | | OP.1 TDD | |
| | | 10MHz+20MHz | OP.1 TDD | | OP.7 TDD | |
| PBCH_RA | dB | All | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PBCH_RB | dB | | | | | |
| PSS_RA | dB | | | | | |
| SSS_RA | dB | | | | | |
| PCFICH_RB | dB | | | | | |
| PHICH_RA | dB | | | | | |
| PHICH_RB | dB | | | | | |
| PDCCH_RA | dB | | | | | |
| PDCCH_RB | dB | | | | | |
| PDSCH_RA | dB | | | | | |
| PDSCH_RB | dB | | | | | |
| OCNG_RA[Note1] | dB | | | | | |
| OCNG_RB[Note1] | dB | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | All | 9 | 9 | 9 | 9 |
| $\hat{E}_s / N_{oc}$ | dB | All | 9 | 9 | 9 | 9 |
| $N_{oc}$ | dBm/15kHz | All | -98 | | | |
| RSRP | dBm/15kHz | All | -89 | -89 | -89 | -89 |
| SCH_RP | dBm/15kHz | All | -89 | -89 | -89 | -89 |
| Propagation Condition | | All | ETU70 | | | |
| Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | | |

**Table A.8.20.4B.1.1-3: Cell specific test parameters for cell search E-UTRA TDD with 20MHz +10MHz bandwidth to UTRA TDD test case (cell 2)**

| Parameter | Unit | Cell 2 (UTRA) | | | |
|---|---|---|---|---|---|
| Timeslot Number | | 0 | | DwPTS | |
| | | T1 | T2 | T1 | T2 |
| UTRA RF Channel Number [NOTE1] | | Channel 2 | | | |
| PCCPCH_Ec/Ior | dB | -3 | -3 | | |
| DwPCH_Ec/Ior | dB | | | 0 | 0 |
| OCNS_Ec/Ior[NOTE2] | dB | -3 | -3 | | |
| $\hat{I}_{or} / I_{oc}$ | dB | -inf | 5 | -inf | 5 |
| $I_{oc}$ | dBm/1.28 MHz | -80 | | | |
| PCCPCH RSCP | dBm | -inf | -78 | n.a. | n.a. |
| Propagation Condition | | Case 3[NOTE3] | | | |
| Note 1: In the case of multi-frequency cell, the UTRA RF Channel Number is the primary frequency's channel number.<br>Note 2: The power of the OCNS channel that is added shall make the total power from the cell to be equal to $I_{or}$.<br>Note 3: Case 3 propagation conditions are defined in Annex B of TS 25.102 | | | | | |

## A.8.20.4B.2 Test Requirements

### A.8.20.4B.2.1 1.28 Mcps TDD option

The test requirements defined in section A.8.20.4.2.1 shall apply to this test case.

# A.8.21 CSG Proximity Indication Testing Case for E-UTRAN FDD – FDD Inter frequency

Note : The test case in this section forms the basis for a signalling test for CSG proximity detection.

### A.8.21.1 Test Purpose and Environment

The purpose of this test is to verify the UE has implemented properly the feature for indicating that the UE is entering or leaving the proximity of one or more CSG member cells based on proximity detection with an autonomous search function, as defined by the requirements in Section 6.4.

The test case consists of three successive segments: Test Preparation, Negative Test, and Positive Test. The test scenario comprises of three E-UTRAN FDD cells on different carriers. Cell 1 represents the serving cell in the proximity of the CSG cell, Cell 2 the CSG cell, and Cell 3 the serving cell not in the proximity of the CSG cell.The description of the test procedure is shown in Table A.8.21-1. The general test parameters and cell specific test parameters are presented in Table A.8.21-2 and Table A.8.21-3 respectively.

**Table A.8.21-1: Description of the test procedures**

| Parameter | Cell Status | Comment |
|---|---|---|
| **Test Preparation** | | |
| Initial Condition | Cell 1 is active | Clean up the UE memory to be free from previously stored cell information for proximity detection.<br>Turn on the UE and allow sufficient time for the UE to select to Cell 1. |
| Time duration T1 | Cell 1 and Cell 2 are active | Turn on Cell 2 at the start of T1.<br>Perform manual CSG selection towards Cell 2. The UE is expected to store necessary information for later proximity detection. |
| End condition | | Turn off the UE. Turn off Cell 1 and Cell 2. |
| **Negative Test** | | |
| Initial Condition | Cell 3 is active | Turn on Cell 3.<br>Turn on the UE and set up the UE in connected mode with Cell 3.. |
| Time duration T2 | Cell 3 is active | Configure the UE with proximity indication control by sending the Reconfiguration message with ReportProximityConfig at the start of T2. The UE is not expected to report “entering” proximity in the negative test. |
| End condition | | Turn off the UE. Turn off Cell 3. |
| **Positive Test** | | |
| Initial Condition | Cell 1 is active | Turn on Cell 1.<br>Turn on the UE and set up the UE in connected mode with Cell 1. |
| Time duration T3 | Cell 1 and Cell 2 are active | Turn on Cell 2 at the start of T3.<br>Configure the UE with proximity indication control by sending the Reconfiguration message with reportProximityConfig at the start of T3. The UE is expected to report “entering” proximity before end of T3. |
| End condition | | Turn off the UE. Turn off Cell 1 and Cell 2. |

**Table A.8.21-2: General test parameters for E-UTRAN FDD-FDD inter frequency cell proximity detection test case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in section A.3.1.1.1 |
| PDSCH allocation | $n_{PRB}$ | 2—3 | 13—36 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in section A.3.1.2.1 |
| A3-Offset | dB | -4 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | off | As specified in section A.3.3 |
| PRACH configuration | | 4 | As specified in table 5.7.1-2 in 3GPP TS 36.211 |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells | | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | | 0 | As specified in Table 8.1.2.1-1 started before T1 starts |

| | | | |
|---|---|---|---|
| Time duration T1 | s | [10] | Defined to give enough time for the UE to complete the manual reselection to Cell 2. |
| Time duration T2 | s | [360] | Defined to be longer enough to see whether the UE will report enter “proximity” indication. |
| Time duration T3 Note 1 | s | [<=360] | The time duration for a UE to report enters “proximity” when the UE is near a CSG cell. |

Note 1: The maximum allowed time duration for the UE to decide either entering or leaving “proximity” is 360s. To reduce test time, T3 may end once UE reports entering “proximity”.

Note 2: The test case assumes an environment where CSG proximity detection results not being impact by non-3GPP signals, such as GPS and WiFi. When the test case is being executed, the UE may ignore any radio signals which are not provided by the test setup which it would otherwise use in proximity estimation.

**Table A.8.21-3: Cell specific test parameters for E-UTRAN FDD-FDD inter frequency cell proximity detection test case**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UARFCN | | Channel 1 | | | Channel 2 | | |
| CSG indicator | | False | | | True | N/A | True |
| Physical cell global identity | | 1 | 1 | 1 | 2 | N/A | 2 |
| CSG identity | | Not sent | | | Sent | N/A | Sent |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | N/A | OP.2 FDD | OP.2 FDD | N/A | OP.2 FDD |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $\hat{E}_s / I_{ot}$ | dB | 0 | -inf | 4 | 7 | -inf | 7 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 0 | -inf | 4 | 7 | -inf | 7 |
| RSRP Note 3 | dBm/15 KHz | -98 | -inf | -94 | -91 | -inf | -91 |
| Propagation Condition | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.21-4: Cell specific test parameters for E-UTRAN FDD-FDD inter frequency cell proximity detection test case (Cell 3)**

| Parameter | Unit | Cell 3 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |

| | | |
|---|---|---|
| E-UARFCN | | Channel 1 |
| CSG indicator | | False |
| Physical cell global identity | | 3 |
| CSG identity | | Not sent |
| $BW_{channel}$ | MHz | 10 |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | N/A |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $\hat{E}_s / I_{ot}$ | dB | -inf |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | -inf |
| RSRP Note 3 | dBm/15 KHz | -inf |
| Propagation Condition | | AWGN |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves

## A.8.21.2 Test Requirements

The UE shall not send an "entering" proximity indication in T2 during Negative Test.

The UE shall send an "entering" proximity indication in T3 during Positive Test.

# A.8.22 E-UTRAN Discovery Signal Measurements

## A.8.22.1 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal

### A.8.22.1.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event when discovery signal is configured in DRX. The test will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.6.2.1.1.

The test parameters are given in Tables A.8.22.1.1-1, A.8.22.1.1-2, A.8.22.1.1-3 and A.8.22.1.1-4. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A3 is configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.1.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| DMTC period | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.1.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA[Note 1] | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in columns for Cell 1 | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | μs | - | | 2.3 (CP/2) | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.1.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf256 | |
| shortDRX | disable | |

**Table A.8.22.1.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.22.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 4864ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.22.2 E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal

### A.8.22.2.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event when discovery signal is configured in DRX. The test will partly verify the TDD-TDD intra-frequency cell search in DRX requirements in clause 8.6.2.1.1.

The test parameters are given in Tables A.8.22.2.1-1, A.8.22.2.1-2, A.8.22.2.1-3 and A.8.22.2.1-4. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A3 is configured. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.2.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| DMTC period | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 2 | As specified in IE MeasDS-Config in TS 36.331 |
| A3-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.2.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.2.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |

| | | | | | |
|---|---|---|---|---|---|
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in columns for Cell 1 | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | | 2.3 (CP/2) | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.2.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf256 | |
| shortDRX | disable | |

**Table A.8.22.2.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|

| | | |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.22.2.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 4864ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.22.3 E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal

### A.8.22.3.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event when discovery signal is configured in DRX. The test will partly verify the FDD-FDD inter-frequency measurement requirements in clause 8.6.2.2.1.

The test parameters are given in Tables A.8.22.3.1-1, A.8.22.3.1-2, A.8.22.3.1-3 and A.8.22.3.1-4. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A3 is configured. Entire discovery signal occasion should be contained in the measurement gap. The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.22.3.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two FDD carrier frequencies are used. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 1 is on RF channel number 2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | 9 | As specified in TS 36.331 clause 6.3.5 |
| DMTC period | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |

| | | | |
|---|---|---|---|
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| PRACH configuration | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.3.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.3.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | | 3 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.8.22.3.1-3: DRX-Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf256 | |
| shortDRX | disable | |

**Table A.8.22.3.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.22.3.2 Test Requirements

UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.22.4 E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal

### A.8.22.4.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event when discovery signal is configured in DRX. The test will partly verify the FDD-FDD inter-frequency measurement requirements in clause 8.6.2.2.1.

The test parameters are given in Tables A.8.22.4.1-1, A.8.22.4.1-2, A.8.22.4.1-3 and A.8.22.4.1-4. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A3 is configured. Entire discovery signal occasion should be contained in the measurement gap. The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

**Table A.8.22.4.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | 9 | As specified in TS 36.331 clause 6.3.5 |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| DMTC period | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 2 | As specified in IE MeasDS-Config in TS 36.331 |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| PRACH configuration | | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.4.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.4.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PBCH_RB | dB | 0 | | 0 | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| SCH_RP Note 3 | dBm/15 kHz | -94 | -94 | -Infinity | -91 |
| Io Note 3 | dBm/9MHz | -64.76 | -64.76 | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | | 3 (Synchronous cells) | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.4.1-3: DRX-Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf256 | |
| shortDRX | disable | |

**Table A.8.22.4.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.22.4.2 Test Requirements

UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 5120 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.8.22.5 E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX based on CSI-RS based discovery signal

### A.8.22.5.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX. The test will partly verify the FDD-FDD intra-frequency cell search in DRX requirements in clause 8.6.3.1.1.2.

The test parameters are given in Tables A.8.22.5.1-1, A.8.22.5.1-2, A.8.22.5.1-3 and A.8.22.5.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event C2 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.5.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| | | Test 1 | |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used. |
| DMTC period [2] | ms | 160 | |
| DMTC period offset [2] | ms | 10 | |
| Discovery signal occasion duration | ms | 1 | |
| c2-Offset | dB | -6 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.5.1-3 |
| Time offset between cells | | 2.3 μs | CP/2 or Synchronous cells |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.5.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD as in A.3.1.1.1 | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | |

| | | | | | |
|---|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| p-C-r10 [2] | dB | -6 | -6 | -6 | -6 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| CRS $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| CSI-RS $\hat{E}_s / N_{oc}$ | dB | 10 | 10 | -Infinity | 10 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| CSI-RS $\hat{E}_s / I_{ot}$ | dB | 10 | 4.54 | -Infinity | 4.54 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| CSI-RSRP Note 4 | dBm/15 KHz | -88 | -88 | -Infinity | -88 |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 4 | dBm/9 MHz | -64.76 | -62.42 | Specified in columns for cell1 | |
| CSI reference signal configurations [16] | | 2 | | 4 | |
| CSI-RS periodicity | ms | 10 | | 10 | |
| CSI-RS subframe offset | | 0 | | 0 | |
| CSI-RS individual offset [2] | dB | 0 | | 0 | |
| CSI-RS muting | | Enable | | Enable | |
| Propagation Condition | | ETU30 | | ETU30 | |
| Timing offset to cell 1 | us | - | | 2.3 (CP/2) | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP, CSI-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.5.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | Sf256 | |

| | | |
|---|---|---|
| shortDRX | disable | |

**Table A.8.22.5.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.22.5.2 Test Requirements

In Test 1, the UE shall send one Event C2 triggered measurement report, with a measurement reporting delay less than 5632ms ($T_{identify_intra_SCE_DRX}$ + $T_{Measurement_Period_intra_FDD_CSI\text{-}RS_DRX}$ = 16* max { $T_{DMTC_periodicity}$, DRX cycle length} + 3**Max*{$T_{DMTC_periodicity}$, DRX cycle length} + 3**Max*{$T_{DMTC_periodicity}$, DRX cycle length} = 22* *Max*{$T_{DMTC_periodicity}$, DRX cycle length}) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event C2 measurement report.

## A.8.22.6 E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX based on CSI-RS based discovery signal

### A.8.22.6.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX. The test will partly verify the TDD-TDD intra-frequency cell search in DRX requirements in clause 8.6.3.1.2.2.

The test parameters are given in Tables A.8.22.6.1-1, A.8.22.6.1-2, A.8.22.6.1-3 and A.8.22.6.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event C2 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.6.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| | | Test 1 | |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used. |
| DMTC period [2] | ms | 160 | |
| DMTC period offset [2] | ms | 10 | |
| Discovery signal occasion duratuion | ms | 2 | |
| c2-Offset | dB | -6 | |
| CP length | | Normal | |

| | | | |
|---|---|---|---|
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.6.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.6.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD as in A.3.1.1.2 | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2 | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| p-C-r10 [2] | dB | -6 | -6 | -6 | -6 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| CRS $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 4 |
| CSI-RS $\hat{E}_s / N_{oc}$ | dB | 10 | 10 | -Infinity | 10 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 4 | -1.46 | -Infinity | -1.46 |
| CSI-RS $\hat{E}_s / I_{ot}$ | dB | 10 | 4.54 | -Infinity | 4.54 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| CSI-RSRP Note 4 | dBm/15 KHz | -88 | -88 | -Infinity | -88 |
| Io Note 4 | dBm/9 MHz | -64.76 | -62.42 | Specified in columns for cell1 | |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Propagation Condition | | ETU30 | | | |
| CSI reference signal configurations [16] | | 2 | | 4 | |

| | | | |
|---|---|---|---|
| CSI-RS periodicity | ms | 10 | 10 |
| CSI-RS subframe offset | | 0 | 0 |
| CSI-RS individual offset [2] | dB | 0 | 0 |
| CSI-RS muting | | Enable | Enable |
| Timing offset to cell 1 | us | 0 | 2.3 (CP/2) |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP, CSI-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.6.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.8.22.6.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.22.6.2 Test Requirements

The UE shall send one Event C2 triggered measurement report, with a measurement reporting delay less than 5632 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event C2 measurement report.

## A.8.22.7 E-UTRAN FDD-FDD Inter-frequency event triggered reporting in DRX based on CSI-RS based discovery signal

### A.8.22.7.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX. The test will partly verify the FDD-FDD inter-frequency cell search in DRX requirements in clause 8.6.3.2.1.2.

The test parameters are given in Tables A.8.22.7.1-1, A.8.22.7.1-2, A.8.22.7.1-3 and A.8.22.7.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event C1 is used. Entire discovery signal occasion should be contained in the measurement gap. The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.7.1-1: General test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| | | Test 1 | |
| Active cell | | Cell 1 | |
| Neighbour cell | | Cell 2 | Cell to be identified. |
| E-UTRA RF Channel Number | | 1,2 | Two FDD carrier frequency is used. |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | 9 | As specified in TS 36.331 clause 6.3.5 |
| DMTC period [2] | ms | 160 | |
| DMTC period offset [2] | ms | 10 | |
| Discovery signal occasion duration | ms | 1 | |
| C1 Threshold | dB | -96 | |
| CP length | | Normal | |
| Hysteresis | dB | 0 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.7.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.7.1-2: Cell specific test parameters for E-UTRAN FDD-FDD inter-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD as in A.3.1.1.1 | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.2 FDD | |
| PBCH_RA | dB | | | | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PHICH_RA | dB | 0 | | 0 | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| p-C-r10 [2] | dB | -6 | -6 | -6 | -6 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| CRS $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| CSI-RS $\hat{E}_s / N_{oc}$ | dB | 10 | 10 | -Infinity | 13 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| CSI-RS $\hat{E}_s / I_{ot}$ | dB | 10 | 10 | -Infinity | 13 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| CSI-RSRP Note 4 | dBm/15 KHz | -88 | -88 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| Io Note 4 | dBm/9 MHz | -64.76 | -64.76 | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | | |
| CSI reference signal configurations [16] | | 2 | | 4 | |
| CSI-RS periodicity | ms | 10 | | 10 | |
| CSI-RS subframe offset | | 0 | | 0 | |
| CSI-RS individual offset [2] | dB | 0 | | 0 | |
| CSI-RS muting | | Enable | | Enable | |
| Timing offset to cell 1 | us | - | | 3us | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP, CSI-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.7.1-3: DRX-Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.8.22.7.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD inter-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | For further information see clause 6.3.2 in TS 36.331. |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213.. |

### A.8.22.7.2 Test Requirements

The UE shall send one Event C1 triggered measurement report, with a measurement reporting delay less than 5888ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2, to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event C1 measurement report

## A.8.22.8 E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation condition in DRX based on CSI-RS based discovery signal

### A.8.22.8.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event in DRX. The test will partly verify the TDD-TDD inter-frequency cell search in DRX requirements in clause 8.6.3.2.2.2.

The test parameters are given in Tables A.8.22.8.1-1, A.8.22.8.1-2, A.8.22.8.1-3 and A.8.22.8.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event C1 is used. Entire discovery signal occasion should be contained in the measurement gap. The subframe contained discovery signal for the measurement is not overlapped with the first 0.5ms period and the last 0.5ms period in every gap.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

The UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.22.8.1-1: General test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Test 1 | Comment |
|---|---|---|---|
| | | Value | |
| E-UTRA RF Channel Number | | 1, 2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell 2 is on RF channel number 2 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | 9 | As specified in TS 36.331 clause 6.3.5 |
| Uplink-downlink configuration | | 1 | As specified in TS 36.211 clause 4.2 Table 4.2-2 |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| DMTC period [2] | ms | 160 | |
| DMTC period offset [2] | ms | 10 | |
| Discovery signal occasion duration | ms | 2 | |
| C1 Threshold | dB | -96 | |
| Hysteresis | dB | 0 | |
| CP length | | Normal | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |

| | | | |
|---|---|---|---|
| PRACH configuration | | 4 | As specified in table 5.7.1-3 in TS 36.211 |
| Access Barring Information | - | Not Sent | No additional delays in random access procedure. |
| DRX | | ON | DRX related parameters are defined in Table A.8.22.8.1-3 |
| T1 | s | 5 | |
| T2 | s | 10 | |

**Table A.8.22.8.1-2: Cell specific test parameters for E-UTRAN TDD-TDD inter-frequency event triggered reporting for DRS measurement based on CSI-RS with DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | 13-37 | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD as in A.3.1.1.2 | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2. | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2. | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 TDD) | | OP.1 TDD | | OP.2 TDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| p-C-r10 [2] | dB | -6 | -6 | -6 | -6 |
| $N_{oc}$ Note 3 | dBm/15 KHz | -98 | | | |
| CRS $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -Infinity | 7 |
| CSI-RS $\hat{E}_s / N_{oc}$ | dB | 10 | 10 | -Infinity | 13 |
| CRS $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -Infinity | 7 |
| CSI-RS $\hat{E}_s / I_{ot}$ | dB | 10 | 10 | -Infinity | 13 |
| RSRP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| CSI-RSRP Note 4 | dBm/15 KHz | -88 | -88 | -Infinity | -85 |
| SCH_RP Note 4 | dBm/15 KHz | -94 | -94 | -Infinity | -91 |
| Io Note 4 | dBm/9 MHz | -64.76 | -64.76 | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | | |
| CSI reference signal configurations [16] | | 2 | | 4 | |
| CSI-RS periodicity | ms | 10 | | 10 | |
| CSI-RS subframe offset | | 0 | | 0 | |

| | | | |
|---|---|---|---|
| CSI-RS individual offset [2] | dB | 0 | 0 |
| CSI-RS muting | | Enable | Enable |
| Timing offset to cell 1 | us | - | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP, CSI-RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.8.22.8.1-3: DRX-Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | Sf256 | |
| shortDRX | disable | |

**Table A.8.22.8.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD inter-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.22.8.2 Test Requirements

In Test 1, the UE shall send one Event C1 triggered measurement report, with a measurement reporting delay less than 5888ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event C1 measurement report.

## A.8.22.9 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal

### A.8.22.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] when CRS based discovery signal is configured within the requirements stated in clause 8.7.2.4.1.

The test parameters are given in Tables A.8.22.9.1-1 and A.8.22.9.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.22.9.1-1: General test parameters for E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| DMTC period | | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset for cells 2 and 3 | | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.14.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.14.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 10 | |
| T2 | | s | 10 | |
| T3 | | s | 5 | |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.22.9.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | | 13-37 | | | 13-37 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | R.0 FDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 FDD | | | R.6 FDD | | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| Io Note 3 | dBm/9MHz | -54.16 | -54.16 | -71.45 | -54.16 | -51.18 | -70.20 | Specified in columns for Cell 2 | | |
| Propagation Condition | | ETU30 | | | ETU30 | | | ETU30 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | µs | - | | | 0 | | | - | | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | | ≤ TAE | | | N/A | | |
| Timing offset to Cell 2 | µs | - | | | - | | | 2.3 (CP/2) | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.22.9.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 5.12s ($13\times$*measCycleSCell*$+ T_{measure_scc_CRS}$) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 480 ($3\times T_{DMTC_periodicity}$) ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 960ms (3× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.22.10 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal

## A.8.22.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events A2 (Serving cell becomes worse than threshold) and A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] when CRS based discovery signal is configured within the requirements stated in clause 8.7.2.4.1.

The test parameters are given in Tables A.8.22.10.1-1 and A.8.22.10.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events A2 (PCell and SCell) and A6 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. At beginning of T3 the transmission powers of cells 1, 2 and 3 are reduced below a threshold value and this shall result in reporting of Event A2 for PCell and SCell, respectively.

**Table A.8.22.10.1-1: General test parameters for E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| DMTC period | | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset for cells 2 and 3 | | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | ms | 2 | As specified in IE MeasDS-Config in TS 36.331 |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.14.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -6 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.14.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 10 | |
| T2 | | s | 10 | |
| T3 | | s | 5 | |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.22.10.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | | 13-37 | | | 13-37 | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 TDD | | | - | | | - | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 TDD | | | R.6 TDD | | | R.6 TDD | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | -3 | 19 | 19 | -3 | -infinity | 19 | -3 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | -3 | 19 | -0.05 | -4.76 | -infinity | -0.05 | -4.76 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -104 | -82 | -82 | -104 | -infinity | -82 | -104 |
| Io Note 3 | dBm/9MHz | -54.16 | -54.16 | -71.45 | -54.16 | -51.18 | -70.20 | Specified in columns for Cell 2 | | |
| Propagation Condition | | ETU30 | | | ETU30 | | | ETU30 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Timing offset to Cell 1 | μs | - | | | 0 | | | - | | |
| Time alignment error relative to cell 1 Note 5 | μs | - | | | ≤ TAE | | | N/A | | |
| Timing offset to Cell 2 | μs | - | | | - | | | 2.3 (CP/2) | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.22.10.2 Test Requirements

The UE shall send one Event A6 triggered measurement report with a measurement reporting delay of less than 5.12s ($13\times$*measCycleSCell*$+ T_{measure_scc_CRS}$) from the beginning of time T2.

The UE shall send one Event A2 triggered measurement report for Cell 1 with a measurement reporting delay of less than 480 ($3\times T_{DMTC_periodicity}$) ms from beginning of time T3.

The UE shall send one Event A2 triggered measurement report for Cell 2 with a measurement reporting delay of less than 960ms (3× measCycleSCell) from beginning of time T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.22.11 E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX based on CSI-RS based discovery signal

### A.8.22.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects events C1 (CSI-RS resource becomes better than threshold) defined in TS 36.331 [2] within the requirements stated in clause 8.7.3.4.1.

The test parameters are given in Tables A.8.22.11.1-1 and A.8.22.11.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events C1 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 and T2 the UE shall not have any information on cell 3. Immediately at beginning of T3 the transmission power of cell 3 is increased above a threshold value and this shall result in reporting of Event C1. At beginning of T2 the transmission powers of cells 1 and 2 are increased above a threshold value and this shall result in reporting of Event C1 for PCell and SCell, respectively.

**Table A.8.22.11.1-1: General test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for CSI-RS based measurements under discovery signal**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset for cells 2 and 3 | | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| C1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event C1. |
| | Threshold CSI-RSRP | dBm | -90 | Actual RSRP threshold for event C1. Needs to take absolute accuracy tolerance in clause 9.1.14.3 into account plus margin. |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| T3 | | s | 10 | |

NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

**Table A.8.22.11.1-2: Cell specific test parameters for E-UTRAN FDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for CSI-RS based measurements under discovery signal**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | | 13-37 | | | 13-37 | | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD as in A.3.1.1.1 | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | | | DL Reference Measurement Channel R.6 FDD as in A.3.1.2.1 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | | OP.2 FDD | | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | | | | |
| OCNG_RB[Note 1] | dB | | | | | | | | | |
| $N_{oc}$[Note 2] | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP[Note 3] | dBm/15 kHz | -104 | -84 | -84 | -104 | -84 | -84 | -infinity | -infinity | -84 |
| CSI-RSRP[Note 3] | dBm/15 kHz | -98 | -78 | -78 | -98 | -78 | -78 | -infinity | -infinity | -78 |
| SCH_RP[Note 3] | dBm/15 kHz | -104 | -84 | -84 | -104 | -84 | -84 | -infinity | -infinity | -84 |
| CRS $\hat{E}_s/N_{oc}$ | dB | -3 | 17 | 17 | -3 | 17 | 17 | -infinity | -infinity | 17 |
| CSI-RS $\hat{E}_s/N_{oc}$ | dB | 3 | 23 | 23 | 3 | 23 | 23 | -infinity | -infinity | 23 |
| CRS $\hat{E}_s/I_{ot}$ | dB | -3 | 17 | 17 | -3 | 17 | -0.09 | -infinity | -infinity | -0.09 |
| CSI-RS $\hat{E}_s/I_{ot}$ | dB | 3 | 23 | 23 | 3 | 23 | 5.91 | -infinity | -infinity | 5.91 |
| CSI-RS resource configurations [16] | | 2 | | | 4 | | | 6 | | |
| p-C-r10 [2] | dB | -6 | | | -6 | | | -6 | | |
| CSI-RS periodicity | ms | 10 | | | 10 | | | 10 | | |

| | | | | |
|---|---|---|---|---|
| CSI-RS subframe offset | | 0 | 0 | 0 |
| CSI-RS individual offset [2] | [dB] | 0 | 0 | 0 |
| CSI-RS muting | | Enable | Enable | Enable |
| Propagation Condition | | ETU30 | ETU30 | ETU30 |
| Time offset to cell 1 | us | 0 | 0 | 2.3 (CP/2) |
| Time alignment error relative to cell1 Note 5 | us | - | ≤ TAE | N/A |
| Timing offset to Cell 2 | µs | - | - | 2.3 (CP/2) |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP, CSI-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.22.11.2 Test Requirements

The UE shall send one Event C1 triggered measurement report for Cell 3 with a measurement reporting delay of less than 6.08s ($T_{identify_scc_SCE} + T_{measure_scc_CSI\text{-}RS} = 13*$*measCycleSCell*$+T_{measure_scc_CRS}+T_{measure_scc_CSI\text{-}RS} =$ 13**measCycleSCell*+3* *measCycleSCell* +3* *measCycleSCell*) from the beginning of time T3.

The UE shall send one Event C1 triggered measurement report for Cell 1 with a measurement reporting delay of less than 480 ms (3* $T_{DMTC_periodicity}$) from beginning of time T2.

The UE shall send one Event C1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 960ms (3× measCycleSCell) from beginning of time T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.22.12 E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX based on CSI-RS based discovery signal

### A.8.22.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event C1 (CSI-RS resource becomes better than threshold) defined in TS 36.331 [2] within the requirements stated in clause 8.7.3.4.1.

The test parameters are given in Tables A.8.22.12.1-1 and A.8.22.12.1-2 below. It is indicated to the UE in the measurement control information that event-triggered reporting with Events C1 is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 and T2 the UE shall not have any information on cell 3. Immediately at beginning of T3 the transmission power of cell 3 is increased above a threshold value and this shall result in reporting of Event C1. At beginning of T2 the transmission powers of cells 1 and 2 are increased above a threshold value and this shall result in reporting of Event C1 for PCell and SCell, respectively.

**Table A.8.22.12.1-1: General test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for CSI-RS based measurements under discovery signal**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | | ms | 160 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset for cells 2 and 3 | | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | Channel bandwidth for cells on primary and secondary component carriers |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2.1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| C1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event C1. |
| | Threshold CSI-RSRP | dBm | -90 | Actual RSRP threshold for event C1. Needs to take absolute accuracy tolerance in clause 9.1.14.3 into account plus margin. |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 320 | |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| T3 | | s | 10 | |
| NOTE: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.22.12.1-2: Cell specific test parameters for E-UTRAN TDD event triggered reporting on configured but deactivated SCell in non-DRX under fading propagation conditions for CSI-RS based measurements under discovery signal**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 13-37 | | | 13-37 | | | 13-37 | | |
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD As in A.3.1.1.2 | | | | | | | | |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2 | | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2 | | | DL Reference Measurement Channel R.6 TDD as in A.3.1.2.2 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 TDD) and in A.3.2.1.2 (OP.2 TDD) | | OP.1 TDD | | | OP.2 TDD | | | OP.2 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | -101 | | | | | |
| RSRP Note 3 | dBm/15 kHz | -104 | -84 | -84 | -104 | -84 | -84 | -infinity | -infinity | -84 |
| CSI-RSRP Note 3 | dBm/15 kHz | -98 | -78 | -78 | -98 | -78 | -78 | -infinity | -infinity | -78 |
| SCH_RP Note 3 | dBm/15 kHz | -104 | -84 | -84 | -104 | -84 | -84 | -infinity | -infinity | -84 |
| CRS $\hat{E}_s/N_{oc}$ | dB | -3 | 17 | 17 | -3 | 17 | 17 | -infinity | -infinity | 17 |
| CSI-RS $\hat{E}_s/N_{oc}$ | dB | 3 | 23 | 23 | 3 | 23 | 23 | -infinity | -infinity | 23 |
| CRS $\hat{E}_s/I_{ot}$ | dB | -3 | 17 | 17 | -3 | 17 | -0.09 | -infinity | -infinity | -0.09 |
| CSI-RS $\hat{E}_s/I_{ot}$ | dB | 3 | 23 | 23 | 3 | 23 | 5.91 | -infinity | -infinity | 5.91 |
| Propagation Condition | | ETU30 | | | ETU30 | | | ETU30 | | |
| CSI-RS resource configurations [16] | | 0 | | | 2 | | | 4 | | |
| CSI-RS periodicity | 10 | 10 | | | 10 | | | 10 | | |
| CSI-RS subframe offset | | 0 | | | 0 | | | 0 | | |
| CSI-RS individual offset [2] | [dB] | 0 | | | 0 | | | 0 | | |
| CSI-RS muting | | Enable | | | Enable | | | Enable | | |
| p-C-r10 [2] | dB | -6 | | | -6 | | | -6 | | |
| Time offset to cell 1 | us | 0 | | | 0 | | | 2.3 (CP/2) | | |
| Time alignment error relative to cell1 Note 5 | us | - | | | ≤ TAE | | | N/A | | |
| Timing offset to Cell 2 | µs | - | | | - | | | 2.3 (CP/2) | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP, CSI-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.22.12.2 Test Requirements

The UE shall send one Event C1 triggered measurement report for Cell 3 with a measurement reporting delay of less than 6.08s ($T_{identify_scc_SCE} + T_{measure_scc_CSI\text{-}RS} = 13*measCycleSCell+T_{measure_scc_CRS}+T_{measure_scc_CSI\text{-}RS} = 13*measCycleSCell+3*measCycleSCell+3*measCycleSCell$) from the beginning of time T3.

The UE shall send one Event C1 triggered measurement report for Cell 1 with a measurement reporting delay of less than 480 ms ($3* T_{DMTC_periodicity}$) from beginning of time T2.

The UE shall send one Event C1 triggered measurement report for Cell 2 with a measurement reporting delay of less than 960ms (3× measCycleSCell) from beginning of time T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.23 E-UTRAN Dual Connectivity Measurements

## A.8.23.1 E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC

### A.8.23.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of intra frequency measurement. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.8.2 and 8.8.3.

The test parameters are given in Table A.8.23.1.1-1, A.8.23.1.1-2, A.8.23.1.1-3 and A.8.23.1.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A1 (PCell and PSCell) and A2 (PCell and PSCell) is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired. Immediately at beginning of T2 the transmission powers of Cell1 and Cell2 are reduced below a threshold value of event A2 and this shall result in reporting of Event A2 for PCell and PSCell, respectively. Immediately after receiving the reporting of event A2 for both PCell and PSCell, PDCCH indicating a new transmission on Cell1 shall be sent continuously to ensure that the UE would not enter the DRX state on MCG throughout T3. At beginning of T3 the transmission powers of Cell1 and Cell2 are increased above a threshold value of event A1 and this shall result in reporting of Event A1 for PCell and PSCell, respectively.

When MCG DRX is used, the uplink time aligment of Cell1 is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting in Cell1. When SCG DRX is used, the UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment in Cell2. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.1.1-1: General test parameters for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -95 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.1.1-3 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 2 | |

| | | | |
|---|---|---|---|
| T2 | s | 10 | |
| T3 | s | 1 | |
| Note 1: Void<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.8.23.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| RSRP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| SCH_RP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| Io Note 3 | dBm/Ch BW | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Receive Time offset to cell1 Note 5 | µs | - | | | 33 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission in Cell1 are assigned to the UE prior to the start of time period T3. |
| Note 5: | Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. |

**Table A.8.23.1.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf1280 | sf80 | |
| shortDRX | disable | disable | |

**Table A.8.23.1.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.23.1.2 Test Requirements

The UE shall send one Event A2 triggered report for PCell on PCell with a measurement reporting delay less than 6.4s (5*MCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A2 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PCell on PCell with a measurement reporting delay less than 200ms from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.23.2 E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in asynchronous DC

## A.8.23.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of intra frequency measurement. This test will partly verify the FDD intra-frequency cell search requirements in clause 8.8.2 and 8.8.3.

The test parameters are given in Table A.8.23.2.1-1, A.8.23.2.1-2, A.8.23.2.1-3 and A.8.23.2.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A1 (PCell and PSCell) and A2 (PCell and PSCell) is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired. Immediately at beginning of T2 the transmission powers of Cell1 and Cell2 are reduced below a threshold value of event A2 and this shall result in reporting of Event A2 for PCell and PSCell, respectively. Immediately after receiving the reporting of event A2 for both PCell and PSCell, PDCCH indicating a new transmission on Cell1 shall be sent continuously to ensure UE would not enter DRX state on MCG throughout T3. At beginning of T3 the transmission powers of Cell1 and Cell2 are increased above a threshold value of event A1 and this shall result in reporting of Event A1 for PCell and PSCell, respectively.

When MCG DRX is used, the uplink time aligment of Cell1 is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting in Cell1. When SCG DRX is used, the UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment in Cell2. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.2.1-1: General test parameters for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in asynchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -95 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.2.1-3 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 2 | |
| T2 | | s | 10 | |
| T3 | | s | 1 | |
| Note 1: Void<br>Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.23.2.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in asynchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| RSRP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| SCH_RP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| Io Note 3 | dBm/Ch BW | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Receive Time offset to cell1 Note 5 | μs | - | | | 500 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission in Cell1 are assigned to the UE prior to the start of time period T3.
Note 5: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.8.23.2.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in asynchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|

| | Value | Value | |
|---|---|---|---|
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf1280 | sf80 | |
| shortDRX | disable | disable | |

**Table A.8.23.2.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD DC intra-frequency event triggered reporting with DRX in asynchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.23.2.2 Test Requirements

The UE shall send one Event A2 triggered report for PCell on PCell with a measurement reporting delay less than 6.4s (5*MCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A2 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PCell on PCell with a measurement reporting delay less than 200ms from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.3 E-UTRAN TDD-TDD DC intra-frequency event triggered reporting with DRX in synchronous DC

### A.8.23.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of intra frequency measurement. This test will partly verify the TDD intra-frequency cell search requirements in clause 8.8.2 and 8.8.3.

The test parameters are given in Table A.8.23.3.1-1, A.8.23.3.1-2, A.8.23.3.1-3 and A.8.23.3.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A1 (PCell and PSCell) and A2 (PCell and PSCell) is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired. Immediately at beginning of T2 the transmission powers of Cell1 and Cell2 are reduced below a threshold value of event A2 and this shall result in reporting of Event A2 for PCell and PSCell, respectively. Immediately after receiving the reporting of event A2 for both PCell and PSCell, PDCCH indicating a new transmission on Cell1 shall be sent continuously to ensure UE would not enter DRX state on MCG throughout T3. At beginning of T3 the transmission powers of Cell1 and Cell2 are increased above a threshold value of event A1 and this shall result in reporting of Event A1 for PCell and PSCell, respectively.

When MCG DRX is used, the uplink time aligment of Cell1 is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting in Cell1. When SCG DRX is used, the UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment in Cell2. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.3.1-1: General test parameters for E-UTRAN TDD-TDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -95 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.3.1-3 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 10 | |
| T3 | | s | 1 | |
| NOTE1: Void | | | | |

**Table A.8.23.3.1-2: Cell specific test parameters for E-UTRAN TDD-TDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| Special subframe configuration Note 6 | | 6 | | | 6 | | |
| Uplink-downlink configuration Note 6 | | 1 | | | 1 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| RSRP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| SCH_RP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| Io Note 3 | dBm/Ch BW | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Receive Time offset to cell1 Note 5 | µs | - | | | 33 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission in Cell1 are assigned to the UE prior to the start of time period T3.
Note 5: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 6: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].

**Table A.8.23.3.1-3: DRX-Configuration for E-UTRAN TDD-TDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf1280 | sf80 | |
| shortDRX | disable | disable | |

**Table A.8.23.3.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD DC intra-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.23.3.2 Test Requirements

The UE shall send one Event A2 triggered report for PCell on PCell with a measurement reporting delay less than 6.4s (5*MCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A2 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PCell on PCell with a measurement reporting delay less than 200ms from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.4 E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC

### A.8.23.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of inter frequency measurement. This test will partly verify the FDD inter-frequency cell search requirements in clause 8.8.4.

The test parameters are given in Table A.8.23.4.1-1, A.8.23.4.1-2, A.8.23.4.1-3 and A.8.23.4.1-4 below. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is PSCell and Cell3 is a neighbour cell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A3 (PCell) is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. During T1 the UE shall not have any information on Cell3. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired.

In this test, UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment in Cell1. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.4.1-1: General test parameters for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 3. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -6 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on carrier frequency of Cell3. |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | s | 5 | |
| Note 1: Void<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.11. | | | |

**Table A.8.23.4.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | | -101 | | -101 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| Io Note 3 | dBm/Ch BW | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -73.22 +10log (NRB,c /50) | -65.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 33 | | - | |

| | | | | |
|---|---|---|---|---|
| Time offset to cell1 | µs | - | - | 3 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | |
| Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |
| Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. | | | | |

**Table A.8.23.4.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.23.4.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.23.4.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3 on PCell, with a measurement reporting delay less than 3.84s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.5 E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in asynchronous DC

### A.8.23.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of inter frequency measurement. This test will partly verify the FDD inter-frequency cell search requirements in clause 8.8.4.

The test parameters are given in Table A.8.23.5.1-1, A.8.23.5.1-2, A.8.23.5.1-3 and A.8.23.5.1-4 below. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is PSCell and Cell3 is a neighbour cell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A3 (PCell) is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. During T1 the UE shall not have any information on Cell3. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired.

In this test, UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment in Cell1. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.5.1-1: General test parameters for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in asynchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 3. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -6 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of Cell3. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| Note 1: Void<br>Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.23.5.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in asynchronous DC**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 1] | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | | -101 | | -101 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| Io Note 3 | dBm/Ch BW | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -73.22 +10log (NRB,c /50) | -65.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Receive time offset to cell1 Note 4 | μs | - | | 500 | | - | |
| Time offset to cell1 | μs | - | | - | | 400 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.8.23.5.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in asynchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.23.5.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD DC inter-frequency event triggered reporting with DRX in asynchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.23.5.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3 on PCell, with a measurement reporting delay less than 3.84s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.23.6 E-UTRAN TDD-TDD DC inter-frequency event triggered reporting with DRX in synchronous DC

## A.8.23.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of inter frequency measurement. This test will partly verify the TDD inter-frequency cell search requirements in clause 8.8.4.

The test parameters are given in Table A.8.23.6.1-1, A.8.23.6.1-2, A.8.23.6.1-3 and A.8.23.6.1-4 below. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is PSCell and Cell3 is a neighbour cell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A3 (PCell) is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. During T1 the UE shall not have any information on Cell3. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired.

In this test, UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment in Cell1. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.6.1-1: General test parameters for E-UTRAN TDD-TDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 3. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -6 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Measurement gap pattern Id | | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of Cell3. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| Note 1: Void | | | | |

**Table A.8.23.6.1-2: Cell specific test parameters for E-UTRAN TDD-TDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note 5 | | 6 | | 6 | | 6 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Uplink-downlink configuration Note 5 | | 1 | | 1 | | 1 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | | -101 | | -101 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| Io Note 3 | dBm/Ch BW | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -73.22 +10log (NRB,c /50) | -65.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 33 | | - | |
| Time offset to cell1 | µs | - | | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].

**Table A.8.23.6.1-3: DRX-Configuration for E-UTRAN TDD-TDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.23.6.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD DC inter-frequency event triggered reporting with DRX in synchronous DC**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.23.6.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3 on PCell, with a measurement reporting delay less than 3.84s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.7 E-UTRAN FDD-FDD Addition and Release Delay of known PSCell in Synchronous DC

### A.8.23.7.1 Test Purpose and Environment

The purpose of this test is to verify that the PSCell addition and release delays under synchronous dual connectivity are within the requirements stated in section 7.14 for the case when the PSCell is known by the UE at the time of addition.

The test parameters are given in Tables A.8.23.7.1-1 and cell-specific parameters in A.8.23.7.1-2 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2 it is indicated to the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of time period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of time period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during time period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of time period T5.

**Table A.8.23.7.1-1: General test parameters for known PSCell addition and release case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Initial Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | Neighbour cell | | Cell2 | Neighbour cell on RF channel number 2. |
| Final Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | PSCell | | Cell2 | PSCell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | | | 0 | Gaps are configured before T2 and released before T3. |
| CQI/PMI periodicity and offset configuration index on cell2 | | | 0 | CQI reporting for PSCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≤ 5 | During this time the UE shall identify neighbour cell (cell2) and report event A4. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |
| Note 1: Void<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.23.7.1-2: Cell specific test parameters for E-UTRAN FDD known PSCell addition and release**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | | | - | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | | | N/A | -85 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | 19 | 19 | 19 | -infinity | 0 | 0 | 0 | 0 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 19 | 19 | 19 | 19 | 19 | infinity | 0 | 0 | 0 | 0 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | N/A | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | |
| Receive time offset to cell1 Note 4 | µs | - | | | | | 33 | | | | |
| PRACH configuration Index Note 5 | | 4 | | | | | 2 | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 5: As specified in table 5.7.1-2 in TS 36.211.
Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T4.

## A.8.23.7.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 115 ms into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 16ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

NOTE: The PSCell addition delay can be expressed as follows as specified in Clause 7.14.2:

$T_{config_PSCell} = 15ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$

Where:

Tactivation_time = 20 ms (cell2 is known to the UE);

$T_{PCell_DU} = 0$ (due to PRACH configurations in cell1 and cell2 being orthogonal in time, i.e. non-overlapping in time);

$T_{PSCell_DU} = 30$ ms (delay due to PRACH transmission to cell2).

This gives a total of 115 ms.

# A.8.23.8 E-UTRAN FDD-FDD Addition and Release Delay of known PSCell in Asynchronous DC

## A.8.23.8.1 Test Purpose and Environment

The purpose of this test is to verify that the PSCell addition and release delays under asynchronous dual connectivity are within the requirements stated in section 7.14 for the case when the PSCell is known by the UE at the time of addition.

The test parameters are given in Tables A.8.23.8.1-1 and cell-specific parameters in A.8.23.8.1-2 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2 it is indicated to the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of time period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of time period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during time period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of time period T5.

**Table A.8.23.8.1-1: General test parameters for known PSCell addition and release case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| | Active PCell | | Cell1 | PCell on RF channel number 1. |

| | | | | |
|---|---|---|---|---|
| Initial Condition | Neighbour cell | | Cell2 | Neighbour cell on RF channel number 2. |
| Final Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | PSCell | | Cell2 | PSCell on RF channel number 2. |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | | | 0 | Gaps are configured before T2 and released before T3. |
| CQI/PMI periodicity and offset configuration index on cell2 | | | 0 | CQI reporting for PSCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≤ 5 | During this time the UE shall identify neighbour cell (cell2) and report event A4. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |
| Note 1: Void<br>Note 2: Even a UE capable of both synchronous and asynchronous DC operations is required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.22.8.1-2: Cell specific test parameters for E-UTRAN FDD known PSCell addition and release**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | | | - | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | | | N/A | -85 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | 19 | 19 | 19 | -infinity | 0 | 0 | 0 | 0 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 19 | 19 | 19 | 19 | 19 | infinity | 0 | 0 | 0 | 0 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | N/A | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | |
| Receive time offset to cell1 Note 4 | µs | - | | | | | 500 | | | | |
| PRACH configuration Index Note 5 | | 4 | | | | | 2 | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 5: As specified in table 5.7.1-2 in TS 36.211
Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T4.

## A.8.23.8.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 115 ms into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 16ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

NOTE: The PSCell addition delay can be expressed as follows as specified in Clause 7.14.2:

$T_{config_PSCell} = 15ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$

Where:

Tactivation_time = 20 ms (cell2 is known to the UE);

$T_{PCell_DU} = 0$ (due to PRACH configurations in cell1 and cell2 being orthogonal in time, i.e. non-overlapping in time);

$T_{PSCell_DU} = 30$ ms (delay due to PRACH transmission to cell2).

This gives a total of 115 ms.

# A.8.23.9 E-UTRAN TDD Addition and Release Delay of known PSCell in Synchronous DC

## A.8.23.9.1 Test Purpose and Environment

The purpose of this test is to verify that the PSCell addition and release delays under synchronous dual connectivity are within the requirements stated in section 7.14 for the case when the PSCell is known by the UE at the time of addition.

The test parameters are given in Tables A.8.23.9.1-1 and cell-specific parameters in A.8.23.9.1-2 below. The test consists of five successive time periods, with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2 it is indicated to the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of time period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of time period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during time period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of time period T5.

**Table A.8.23.9.1-1: General test parameters for known PSCell addition and release case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Initial Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | Neighbour cell | | Cell2 | Neighbour cell on RF channel number 2. |

| | | | | |
|---|---|---|---|---|
| Final Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | PSCell | | Cell2 | PSCell on RF channel number 2. |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | | | 0 | Gaps are configured before T2 and released before T3. |
| PRACH configuration on cell2 | | | 53 | As specified in table 5.7.1-3 in TS 36.211 |
| CQI/PMI periodicity and offset configuration index on cell2 | | | 0 | CQI reporting for PSCell every uplink subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≤ 5 | During this time the UE shall identify neighbour cell (cell2) and report event A4. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |
| Note 1: Void | | | | |

**Table A.8.23.9.1-2: Cell specific test parameters for E-UTRAN TDD known PSCell addition and release**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| Special subframe configuration Note 7 | | 6 | | | | | 6 | | | | |
| Uplink-downlink configuration Note 7 | | 1 | | | | | 1 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | | - | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | | | N/A | -85 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | 19 | 19 | 19 | -infinity | 0 | 0 | 0 | 0 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 19 | 19 | 19 | 19 | 19 | infinity | 0 | 0 | 0 | 0 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | N/A | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | |
| Receive time offset to cell1 Note 4 | µs | - | | | | | 33 | | | | |
| PRACH configuration Index Note 5 | | 56 | | | | | 50 | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 5: As specified in table 5.7.1-3 in TS 36.211
Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T4.
Note 7: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].

### A.8.23.9.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 115 ms into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 16ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

NOTE: The PSCell addition delay can be expressed as follows as specified in Clause 7.14.2:

$$T_{config_PSCell} = 15ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$$

Where:

Tactivation_time = 20 ms (cell2 is known to the UE);

$T_{PCell_DU}$ = 0 (due to PRACH configurations in cell1 and cell2 being orthogonal in time, i.e. non-overlapping in time);

$T_{PSCell_DU}$ = 30 ms (delay due to PRACH transmission to cell2).

This gives a total of 115 ms.

# A.8.23.10 E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD

## A.8.23.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of PCell and PSCell intra frequency measurement. This test will partly verify the intra-frequency measurement requirements in clause 8.8.2 and clause 8.8.3.

The test parameters are given in Table A.8.23.10.1-1, A.8.23.10.1-2, A.8.23.10.1-3 and A.8.23.10.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A1 (PCell and PSCell) and A2 (PCell and PSCell) is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have expired. Immediately at beginning of T2 the transmission powers of Cell1 and Cell2 are reduced below a threshold value of event A2 and this shall result in reporting of Event A2 for PCell and PSCell, respectively. Immediately after receiving the reporting of event A2 for both PCell and PSCell, PDCCH indicating a new transmission on Cell1 shall be sent continuously to ensure that the UE would not enter the DRX state on MCG throughout T3. At beginning of T3 the transmission powers of Cell1 and Cell2 are increased above a threshold value of event A1 and this shall result in reporting of Event A1 for PCell and PSCell, respectively.

When MCG DRX is used, the uplink time aligment of Cell1 is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting in Cell1. When SCG DRX is used, the UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment in Cell2. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.10.1-1: General test parameters for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -95 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. This configuration is for the TDD PSCell. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The configuration is for the TDD PSCell. |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.10.1-3 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 2 | |
| T2 | | s | 10 | |
| T3 | | s | 1 | |

| | |
|---|---|
| Note 1: | This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. |
| Note 2: | A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.6.11. |

**Table A.8.23.10.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| RSRP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| SCH_RP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| Io Note 3 | dBm/Ch BW | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Receive Time offset to cell1 Note 5 | µs | - | | | 33 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. |
| Note 3: | RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission in Cell1 are assigned to the UE prior to the start of time period T3. |
| Note 5: | Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. |

**Table A.8.23.10.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf1280 | sf80 | |
| shortDRX | disable | disable | |

**Table A.8.23.10.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.23.10.2 Test Requirements

The UE shall send one Event A2 triggered report for PCell on PCell with a measurement reporting delay less than 6.4s (5*MCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A2 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PCell on PCell with a measurement reporting delay less than 200ms from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.8.23.11 E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD

## A.8.23.11.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of PCell and PSCell intra frequency measurement. This test will partly verify the intra-frequency measurement requirements in clause 8.8.2 and clause 8.8.3.

The test parameters are given in Table A.8.23.11.1-1, A.8.23.11.1-2, A.8.23.11.1-3 and A.8.23.11.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell and Cell2 is PSCell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A1 (PCell and PSCell) and A2 (PCell and PSCell) is used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired. Immediately at beginning of T2 the transmission powers of Cell1 and Cell2 are reduced below a threshold value of event A2 and this shall result in reporting of Event A2 for PCell and PSCell, respectively. Immediately after receiving the reporting of event A2 for both PCell and PSCell, PDCCH indicating a new transmission on Cell1 shall be sent continuously to ensure UE would not enter DRX state on MCG throughout T3. At beginning of T3 the transmission powers of Cell1 and Cell2 are increased above a threshold value of event A1 and this shall result in reporting of Event A1 for PCell and PSCell, respectively.

When MCG DRX is used, the uplink time aligment of Cell1 is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting in Cell1. When SCG DRX is used, the UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment in Cell2. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.11.1-1: General test parameters for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| A1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A1. |
| | Threshold RSRP | dBm | -95 | Actual RSRP threshold for event A1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| A2 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A2. |
| | Threshold RSRP | dBm | -99 | Actual RSRP threshold for event A2. Needs to take absolute accuracy tolerance in clause 9.1.11.1 and 9.1.11.2 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The configuration is the TDD PCell |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The configuration is for TDD PCell |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.3.1-3 |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 10 | |
| T3 | | s | 1 | |
| NOTE 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |

**Table A.8.23.11.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | | -104 | | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| $\hat{E}_s / I_{ot}$ | dB | 16 | -2.5 | 20 | 16 | -2.5 | 20 |
| RSRP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| SCH_RP Note 3 | dBm/15 KHz | -88 | -106.5 | -84 | -88 | -106.5 | -84 |
| Io Note 3 | dBm/Ch BW | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) | -60.11 +10log ($N_{RB,c}$ /50) | -74.28 +10log ($N_{RB,c}$ /50) | -56.18 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | | ETU70 | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | |
| Receive Time offset to cell1 Note 5 | µs | - | | | 33 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission in Cell1 are assigned to the UE prior to the start of time period T3.
Note 5: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

**Table A.8.23.11-3: DRX-Configuration for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf1280 | sf80 | |
| shortDRX | disable | disable | |

**Table A.8.23.11.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.23.11.2 Test Requirements

The UE shall send one Event A2 triggered report for PCell on PCell with a measurement reporting delay less than 6.4s (5*MCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A2 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH to obtain allocation to send the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PCell on PCell with a measurement reporting delay less than 200ms from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall send one Event A1 triggered report for PSCell on PCell with a measurement reporting delay less than 400ms (5*SCG_DRX cycle) from the beginning of time period T3. The measurement reporting delay is defined as the time from the beginning of time period T3 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.12 E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD

### A.8.23.12.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of inter frequency measurement. This test will partly verify the inter-frequency cell search requirements in clause 8.8.4.

The test parameters are given in Tables A.8.23.12.1-1, A.8.23.12.1-2, A.8.23.12.1-3 and A.8.23.12.1-4 below. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is PSCell and Cell3 is a neighbour cell. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 (PCell) is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. During T1 the UE shall not have any information on Cell3. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired.

In this test, UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment in Cell1. Furthermore the UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.12.1-1: General test parameters for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 3. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -6 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.12.1-3 |
| Measurement gap pattern Id | | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of Cell3. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| Note 1: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.23.12.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note5 | | - | | 6 | | 6 | |
| Uplink-downlink configuration Note5 | | - | | 1 | | 1 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | | -101 | | N/A | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| Io Note 3 | dBm/Ch BW | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | N/A | -65.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 33 | | - | |
| Time offset to cell1 | µs | - | | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].

**Table A.8.23.12.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.23.12.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 [2] |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 [2] and section10.1 in TS 36.213 [3]. |

### A.8.23.12.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3 on PCell, with a measurement reporting delay less than 3.84s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.13 E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD

### A.8.23.13.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of inter frequency measurement. This test will partly verify the inter-frequency cell search requirements in clause 8.8.4.

The test parameters are given in Table A.8.23.13.1-1, A.8.23.13.1-2, A.8.23.13.1-3 and A.8.23.13.1-4 below. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is PCell, Cell2 is PSCell and Cell3 is a neighbour cell. In the measurement control information it is indicated to the UE that event-triggered reporting with Events A3 (PCell) is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. During T1 the UE shall not have any information on Cell3. Prior to the start of the time duration T1, DRX configurations on MCG and SCG are enabled and DRX inactivity timers for MCG and SCG have already been expired.

In this test, UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time aligment timer to keep UE uplink time alignment in Cell1. Furthermore the UE is allocated with PUSCH resource at every DRX cycle.

**Table A.8.23.13.1-1: General test parameters for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 3. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -6 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | ON | DRX related parameters are defined in Table A.8.23.13.1-3 |
| Measurement gap pattern Id | | | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of Cell3. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |
| Note 1: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.11. | | | | |

**Table A.8.23.13.1-2: Cell specific test parameters for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note5 | | 6 | | - | | - | |
| Uplink-downlink configuration Note5 | | 1 | | - | | - | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_PB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_PB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -101 | | -101 | | N/A | -101 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | 4 | -infinity | 7 |
| RSRP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| SCH_RP Note 3 | dBm/15 KHz | -97 | -97 | -97 | -97 | -infinity | -94 |
| Io Note 3 | dBm/Ch BW | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | -67.76 +10log ($N_{RB,c}$ /50) | N/A | -65.43 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 33 | | - | |
| Time offset to cell1 | µs | - | | - | | 3 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].

**Table A.8.23.13.1-3: DRX-Configuration for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 [2] |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf80 | sf1280 | |
| shortDRX | disable | disable | |

**Table A.8.23.13.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-FDD DC inter-frequency event triggered reporting with DRX in synchronous DC with PCell in TDD**

| Field | Cell1 | Cell2 | Comment |
|---|---|---|---|
| | Value | Value | |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 [2] |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 [2] and section10.1 in TS 36.213 [3]. |

### A.8.23.13.2 Test Requirements

The UE shall send one Event A3 triggered measurement report for Cell 3 on PCell, with a measurement reporting delay less than 3.84s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.8.23.14 E-UTRAN TDD-FDD Addition and Release Delay of known PSCell in Synchronous DC with PCell in FDD

### A.8.23.14.1 Test Purpose and Environment

The purpose of this test is to verify that the PSCell addition and release delays under synchronous dual connectivity are within the requirements stated in section 7.14 for the case when the PSCell is known by the UE at the time of addition.

The test parameters are given in Tables A.8.23.14.1-1 and cell-specific parameters in A.8.23.14.1-2 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2 it is indicated to the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of time period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of time period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during time period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of time period T5.

**Table A.8.23.14.1-1: General test parameters for known PSCell addition and release case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Initial Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | Neighbour cell | | Cell2 | Neighbour cell on RF channel number 2. |
| Final Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | PSCell | | Cell2 | PSCell on RF channel number 2. |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | | | 0 | Gaps are configured before T2 and released before T3. |
| CQI/PMI periodicity and offset configuration index on cell2 | | | 0 | CQI reporting for PSCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≤ 5 | During this time the UE shall identify neighbour cell (cell2) and report event A4. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.6.11. | | | | |

**Table A.8.23.14.1-2: Cell specific test parameters for E-UTRAN known PSCell addition and release**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| Special subframe configuration | | N/A | | | | | 6 | | | | |
| Uplink-downlink configuration | | N/A | | | | | 1 | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | | | - | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | | | N/A | -85 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | 19 | 19 | 19 | -infinity | 0 | 0 | 0 | 0 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | 19 | 19 | 19 | infinity | 0 | 0 | 0 | 0 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | N/A | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | |
| Receive time offset to cell1 Note 4 | µs | - | | | | | 33 | | | | |
| PRACH configuration Index Note 5 | | 4 | | | | | 50 | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 5: As specified in table 5.7.1-2 in TS 36.211.

Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T4.

### A.8.23.14.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 115 ms into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall stop sending CSI reports for PSCell in at latest 16ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

NOTE: The PSCell addition delay can be expressed as follows as specified in Clause 7.14.2:

$T_{config_PSCell} = 15ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$

Where:

Tactivation_time = 20 ms (cell2 is known to the UE);

$T_{PCell_DU}$ = 0 (due to PRACH configurations in cell1 and cell2 being orthogonal in time, i.e. non-overlapping in time);

$T_{PSCell_DU}$ = 30 ms (delay due to PRACH transmission to cell2).

This gives a total of 115 ms.

## A.8.23.15 E-UTRAN TDD-FDD Addition and Release Delay of known PSCell in Synchronous DC with PCell in TDD

### A.8.23.15.1 Test Purpose and Environment

The purpose of this test is to verify that the PSCell addition and release delays under synchronous dual connectivity are within the requirements stated in section 7.14 for the case when the PSCell is known by the UE at the time of addition.

The test parameters are given in Tables A.8.23.15.1-1 and cell-specific parameters in A.8.23.15.1-2 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2 it is indicated to the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of time period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of time period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during time period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of time period T5.

**Table A.8.23.15.1-1: General test parameters for known PSCell addition and release case**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| | Active PCell | | Cell1 | PCell on RF channel number 1. |

| | | | | |
|---|---|---|---|---|
| Initial Condition | Neighbour cell | | Cell2 | Neighbour cell on RF channel number 2. |
| Final Condition | Active PCell | | Cell1 | PCell on RF channel number 1. |
| | PSCell | | Cell2 | PSCell on RF channel number 2. |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -93 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| Measurement gap pattern Id | | | 0 | Gaps are configured before T2 and released before T3. |
| CQI/PMI periodicity and offset configuration index on cell2 | | | 0 | CQI reporting for PSCell every second subframe |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on carrier frequency of cell2. |
| T1 | | s | 5 | During this time the PCell shall be known and cell2 shall be unknown. |
| T2 | | s | ≤ 5 | During this time the UE shall identify neighbour cell (cell2) and report event A4. |
| T3 | | s | 1 | During this time the UE adds the PSCell. |
| T4 | | s | 1 | During this time the UE sends CSI reports for PSCell. |
| T5 | | s | 1 | During this time the UE releases the PSCell. |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: A UE capable of both synchronous and asynchronous DC operations is not required to pass this test case in accordance with the principle defined in section A.3.6.11. | | | | |

**Table A.8.23.15.1-2: Cell specific test parameters for E-UTRAN known PSCell addition and release**

| Parameter | Unit | Cell 1 | | | | | Cell 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel Number | | 1 | | | | | 2 | | | | |
| Special subframe configuration | | 6 | | | | | N/A | | | | |
| Uplink-downlink configuration | | 1 | | | | | N/A | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | | | - | | | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | | |
| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | | | |
| PBCH_RA | dB | 0 | | | | | 0 | | | | |
| PBCH_RB | dB | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | | | | N/A | -85 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 19 | 19 | 19 | 19 | 19 | -infinity | 0 | 0 | 0 | 0 |
| $\hat{E}_s/I_{ot}$ | dB | 19 | 19 | 19 | 19 | 19 | infinity | 0 | 0 | 0 | 0 |
| RSRP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -82 | -82 | -82 | -82 | -82 | -infinity | -85 | -85 | -85 | -85 |
| Io Note 3 | dBm/Ch BW | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | -54.16 +10log ($N_{RB,c}$ /50) | N/A | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) | -54.21 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | | | AWGN | | | | |
| Antenna Configuration | | 1x2 | | | | | 1x2 | | | | |
| Receive time offset to cell1 Note 4 | µs | - | | | | | 33 | | | | |
| PRACH configuration Index Note 5 | | 56 | | | | | 2 | | | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/I_{ot}$, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 5: As specified in table 5.7.1-2 in TS 36.211.

Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T4.

### A.8.23.15.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 115 ms into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall stop sending CSI reports for PSCell in at latest 16ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

NOTE: The PSCell addition delay can be expressed as follows as specified in Clause 7.14.2:

$T_{config_PSCell} = 15ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{PSCell_DU}$

Where:

Tactivation_time = 20 ms (cell2 is known to the UE);

$T_{PCell_DU} = 0$ (due to PRACH configurations in cell1 and cell2 being orthogonal in time, i.e. non-overlapping in time);

$T_{PSCell_DU} = 30$ ms (delay due to PRACH transmission to cell2).

This gives a total of 115 ms.

## A.8.23.16 E-UTRAN FDD-FDD DC SSTD measurement reporting delay with no DRX in asynchronous DC

### A.8.23.16.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of SSTD measurements. The test partially verifies the requirement in SSTD Measurements for E-UTRA Dual Connectivity, section 8.8.7. This test is applicable to UEs which support asynchronous dual connectivity and support SSTD measurements.

The test parameters are given in Tables A.8.23.16.1-1 and A.8.23.16.1-2. In this test there are 2 cells, a PCell and a PScell, on different frequencies.

The test consists of two time phases, T1 and T2. During T1 a dual connectivity connection is established. At the end of T1 a measurement with the IE reportSSTD-Meas set to TRUE is configured by the test equipment, such that the measurement configuration is available to the UE at the transition from T1 to T2. The SSTD reporting delay is the time from the start of T2 until an SSTD measurement report is transmitted by the UE.

**Table A.8.23.16.1-1: General test parameters for E-UTRAN FDD-FDD DC SSTD measurement reporting delay with no DRX in asynchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | |
| T1 | s | 2 | |
| T2 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.23.16.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC SSTD measurement reporting delay with no DRX in asynchronous DC**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |

| | | | | | |
|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | -104 | |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | -3 | -3 | -3 | -3 |
| RSRP Note 3 | dBm/15 KHz | -107 | -107 | -107 | -74.28 |
| SCH_RP Note 3 | dBm/15 KHz | -107 | -107 | -107 | -107 |
| Io Note 3 | dBm/Ch BW | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 33 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

### A.8.23.16.2 Test Requirements

The UE shall send a measurement report containing a ***MeasResultSSTD*** IE within RRC procedure delay + 200ms + 2 x $TTI_{DCCH}$ =217ms from the start of T2.

## A.8.23.17 E-UTRAN FDD-FDD DC SSTD measurement reporting delay with DRX in asynchronous DC

### A.8.23.17.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of SSTD measurements. The test partially verifies the requirement in SSTD Measurements for E-UTRA Dual Connectivity, section 8.8.7. This test is applicable to UEs which support asynchronous dual connectivity and support SSTD measurements.

The test parameters are given in Tables A.8.23.17.1-1, A.8.23.17.1-2 and A.8.23.17.1-3. In this test there are 2 cells, a PCell and a PScell, on different frequencies.

The test consists of two time phases, T1 and T2. During T1 a dual connectivity connection is established. At the end of T1 a measurement with the IE reportSSTD-Meas set to TRUE is configured by the test equipment, such that the measurement configuration is available to the UE at the transition from T1 to T2. The SSTD reporting delay is the time from the start of T2 until an SSTD measurement report is transmitted by the UE.

**Table A.8.23.17.1-1: General test parameters for E-UTRAN FDD-FDD DC SSTD measurement reporting delay with DRX in asynchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | ON | DRX related parameters are defined in Table A.8.23.17.1-3 |
| T1 | s | 2 | |
| T2 | s | 10 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.8.23.17.1-2: Cell specific test parameters for E-UTRAN FDD-FDD DC SSTD measurement reporting delay with DRX in asynchronous DC**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_PB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_PB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | | -104 | |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | -3 | -3 | -3 | -3 |
| RSRP Note 3 | dBm/15 KHz | -107 | -107 | -107 | -74.28 |
| SCH_RP Note 3 | dBm/15 KHz | -107 | -107 | -107 | -107 |

| | | | | | |
|---|---|---|---|---|---|
| Io Note 3 | dBm/Ch BW | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Receive Time offset to cell1 Note 4 | µs | - | | 500 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. | | | | | |
| Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| Note 4: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells. | | | | | |

**Table A.8.23.17.1-3: DRX-Configuration for E-UTRAN FDD-FDD DC SSTD measurement reporting delay with DRX in asynchronous DC**

| Field | PCell | PSCell | Comment |
|---|---|---|---|
| | Value | Value | |
| onDurationTimer | psf1 | psf1 | |
| drx-InactivityTimer | psf1 | psf1 | |
| drx-RetransmissionTimer | psf1 | psf1 | |
| longDRX-CycleStartOffset | sf320 | sf320 | |
| shortDRX | disable | disable | |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.8.23.17.2 Test Requirements

The UE shall send a measurement report containing a ***MeasResultSSTD*** IE within RRC procedure delay + 5*320ms + 2 x $TTI_{DCCH}$ =1617ms from the start of T2.

## A.8.23.18 E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC

### A.8.23.18.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.8.5.1.

The test scenario comprises of two E-UTRA FDD carriers and three cells as given in tables A.8.23.18.1-1 and A.8.23.18.1-2. Cell 1 is PCell, Cell 2 is PSCell and Cell 3 is neighbour cell. PDCCHs indicating new transmissions shall be sent continuously on PCell and PSCell to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.23.18.1-1: General test parameters for E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Active PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 2. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -3 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |

| | | | |
|---|---|---|---|
| DRX | | OFF | DRX related parameters are defined in Table A.8.23.4.1-3 |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.18.1-2: Cell specific test parameters for E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_PB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_PB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 | -Infinity | 11 | 11 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | 8 | 8 | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Time offset to cell1 | μs | - | | | 33 | | | 3 | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $\hat{E}_s/I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

### A.8.23.18.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.2.3.1. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.23.19 E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC

### A.8.23.19.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.8.5.1.

The test scenario comprises of two E-UTRA FDD carriers and three cells as given in tables A.8.23.19.1-1 and A.8.23.19.1-2. Cell 1 is PCell, Cell 2 is PSCell and Cell 3 is neighbour cell. PDCCHs indicating new transmissions shall be sent continuously on PCell and PSCell to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.23.19.1-1: General test parameters for E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Active PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 2. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -3 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | DRX related parameters are defined in Table A.8.23.4.1-3 |
| si-RequestForHO | | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.19.1-2: Cell specific test parameters for E-UTRAN FDD - FDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: | | 5MHz: R.7 FDD<br>10MHz:R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD<br>10MHz:R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz:R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz:OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz:OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz:OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_PB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_PB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 | -Infinity | 11 | 11 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | 8 | 8 | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Time offset to cell1 | μs | - | | | 500 | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s / I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.23.19.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.2.3.1. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.23.20 E-UTRAN TDD - TDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC

### A.8.23.20.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell with autonomous gaps in clause 8.8.5.1.

The test scenario comprises of two E-UTRA TDD carriers and three cells as given in tables A.8.23.20.1-1 and A.8.23.20.1-2. Cell 1 is PCell, Cell 2 is PSCell and Cell 3 is neighbour cell. PDCCHs indicating new transmissions shall be sent continuously on PCell and PSCell to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 2 becomes detectable and the UE is expected to detect and send a measurement report.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE.

**Table A.8.23.20.1-1: General test parameters for E-UTRAN TDD - TDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | | Cell1 | PCell on RF channel number 1. |
| Active PSCell | | | Cell2 | PSCell on RF channel number 2. |
| Neighbour cell | | | Cell3 | Neighbour cell on RF channel number 2. |
| A3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A3. |
| | A3-offset | dB | -3 | |
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| DRX | | | OFF | DRX related parameters are defined in Table A.8.23.4.1-3 |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration applies to all cells. |
| si-RequestForHO | | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |

| | | | |
|---|---|---|---|
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on carrier frequency of Cell2. |
| Filter coefficient | | 0 | L3 filtering is not used |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.20.1-2: Cell specific test parameters for E-UTRAN TDD - TDD DC Intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>5MHz: $N_{RB,c}$ = 25 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>5MHz: $N_{RB,c}$ = 25 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>5MHz: $N_{RB,c}$ = 25 | | |
| PDSCH parameters: | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters: | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_PB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_PB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | 8 | 8 | 8 | 8 | 8 | 8 | -Infinity | 11 | 11 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 8 | 8 | 8 | 8 | -3.3 | -3.3 | -Infinity | 2.36 | 2.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| SCH_RP Note3 | dBm/15 KHz | -90 | -90 | -90 | -90 | -90 | -90 | -Infinity | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -61.58 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | -57.23 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 2 | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| Time offset to cell1 | µs | - | | | 33 | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s / I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.23.20.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 2 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,intra}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent during identifying the cell global identifier of cell 2 according to the requirement in Clause 8.1.2.2.3.1. Secondly, given that continuous DL data allocation, additional 20 ACK/NACK shall be sent from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 2.

## A.8.23.21 E-UTRAN FDD - FDD DC Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC

### A.8.23.21.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC in clause 8.8.6.1.

The test scenario comprises of three E-UTRA FDD cells, PCell (Cell 1), PSCell (Cell 2) and neighbour cell (Cell 3) and each cell on one carrier as given in tables A.8.23.21.1-1 and A.8.23.21.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 3 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to UE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.23.21.1-1: General test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF channel number | | 1, 2, 3 | Three FDD carrier frequencies are used. |
| Active cell | | Cell 1, Cell 2 | Cell 1 is on RF channel number 1<br>Cell 2 is on RF channel number 2 |
| Neighbour cell | | Cell 3 | Cell 3 is on RF channel number 3. |
| CP length | | Normal | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.21.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD,<br>10MHz: R.3 FDD,<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_PB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_PB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| timing offset to cell1 | μs | - | | | 33 | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s / I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.23.21.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 3 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected both on cells in MCG and SCG as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent both on cells in MCG and SCG during identifying the cell global identifier of cell 3 according to the requirement in Clause 8.8.6.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 20 ACK/NACK shall be sent both on cells in MCG and SCG from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 3.

## A.8.23.22 E-UTRAN FDD - FDD DC Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC

### A.8.23.22.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC in clause 8.8.6.1.

The test scenario comprises of threeE-UTRA FDD cells, PCell (Cell 1), PSCell (Cell 2) and neighbour cell (Cell 3) and each cell on one carrier as given in tables A.8.23.22.1-1 and A.8.23.22.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 3 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.23.22.1-1: General test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF channel number | | 1, 2, 3 | Three FDD carrier frequencies are used. |
| Active cell | | Cell 1, Cell 2 | Cell 1 is on RF channel number 1<br>Cell 2 is on RF channel number 2 |
| Neighbour cell | | Cell 3 | Cell 3 is on RF channel number 3. |
| CP length | | Normal | |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.22.1-2: Cell specific test parameters for E-UTRAN FDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/ PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_PB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_PB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RANote 1 | dB | | | | | | | | | |
| OCNG_RBNote 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| timing offset to cell1 | μs | - | | | 500 | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s / I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.23.22.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 3 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 80 ACK/NACK shall be detected both on cells in MCG and SCG as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 80 ACK/NACK number is caused by two parts. Firstly, at least 60 ACK/NACK shall be sent both on cells in MCG and SCG during identifying the cell global identifier of cell 3 according to the requirement in Clause 8.8.6.1. Secondly, given that continuous DL data allocation, and the measurement gaps have been deconfigured before the start of T3, additional 20 ACK/NACK shall be sent both on cells in MCG and SCG from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 3.

## A.8.23.23 E-UTRAN TDD - TDD DC Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC

### A.8.23.23.1 Test Purpose and Environment

This test is to verify the requirement for identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC in clause 8.8.6.1.

The test scenario comprises of three E-UTRA TDD cells, PCell (Cell 1), PSCell (Cell 2) and neighbour cell (Cell 3) and each cell on one carrier as given in tables A.8.23.23.1-1 and A.8.23.23.1-2. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would have ACK/NACK sending during identifying a new CGI of E-UTRAN cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of cell 3. Starting T2, cell 3 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 is configured before T2 begins to enable inter-frequency monitoring.

A RRC message implying SI reading shall be sent to the UE during period T2, after the UE has reported Event A3. The RRC message shall create a measurement report configuration with purpose *reportCGI* and *si-RequestForHO* set to TRUE. The start of T3 is the instant when the last TTI containing the RRC message implying SI reading is sent to the UE. Measurement gaps shall be deconfigured before the start of T3.

**Table A.8.23.23.1-1: General test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF channel number | | 1, 2, 3 | Three TDD carrier frequencies are used. |
| Active cell | | Cell 1, Cell 2 | Cell 1 is on RF channel number 1<br>Cell 2 is on RF channel number 2. |
| Neighbour cell | | Cell 3 | Cell 3 is on RF channel number 3. |
| CP length | | Normal | |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| A3-Offset | dB | -6 | |
| Hysteresis | dB | 0 | |
| TimeToTrigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| si-RequestForHO | | TRUE | As specified in clause 5.5.3.1 in TS 36.331. |
| T1 | s | 5 | |
| T2 | s | ≤10 | |
| T3 | s | 5 | |

**Table A.8.23.23.1-2: Cell specific test parameters for E-UTRAN TDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -98 | | | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | 4 | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| SCH_RP Note3 | dBm/15 KHz | -94 | -94 | -94 | -94 | -94 | -94 | -Infinity | -91 | -91 |
| Io Note 3 | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) | -62.42 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | | 1x2 Low | | | 1x2 Low | | |
| timing offset to cell1 | μs | - | | | 33 | | | 3 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s / I_{ot}$, RSRP, Io and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.23.23.2 Test Requirements

The UE shall transmit a measurement report containing the cell global identifier of cell 3 within 170 milliseconds from the start of T3.

Test requirement = RRC Procedure delay + $T_{identify_CGI,\ inter}$ + reporting delay

= 15 + 150 + 2ms from the start of T3

= 167 ms, allow 170 ms.

The UE shall be scheduled continuously throughout the test, and from the start of T3 until 170 ms at least 42 ACK/NACK shall be detected both on cells in MCG and SCG as being transmitted by the UE.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The overall 42 ACK/NACK number is caused by two parts. Firstly, at least 30 ACK/NACK shall be sent both on cells in MCG and SCG during identifying the cell global identifier of cell 3 according to the requirement in Clause 8.8.6.1. Secondly, given that continuous DL data allocation and the measurement gaps have been deconfigured before the start of T3, additional 12 ACK/NACK shall be sent both on cells in MCG and SCG from the start of T3 until 170 ms excludes 150 ms for identifying the cell global identifier of cell 3.

# A.8.23.24 E-UTRAN FDD-FDD DC activation and deactivation of known SCell in Non-DRX in synchronous DC

## A.8.23.24.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation requirements specified in clause 7.18 for Dual Connectivity, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.23.24-1 and cell-specific parameters in A.8.23.24-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 2 (PSCell) on radio channel 2, but is not aware of Cell 3 (SCell1 in MCG) on radio channel 3 (SCC1). The UE is only monitoring the PCC and the frequency of PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which a MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell1 at latest in asubframe (m+24). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell and PSCell interruption due to activation of SCell1 shall not occur outside subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell and PSCell interruption due to the deactivation of SCell1 shall not occur outside subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of the SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.23.24-1: General test parameters for E-UTRAN FDD-FDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | PCell on RF channel number 1. |
| Configured PScell | | Cell 2 | PSCell on RF channel number 2. |
| Deconfigured SCell in MCG | | Cell 3 | Deconfigured SCell in MCG on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on the frequency of PSCell. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC1. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |

| | | | |
|---|---|---|---|
| T1 | s | 7 | During this time the PCell and PSCell shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.23.24-2: Cell specific test parameters for E-UTRAN FDD-FDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | | -59.13+10log ($N_{RB,c}$ /50) | | |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | | 1x2 | | |
| Receive timing offset to Cell1 Note 5 | µs | - | | | 33 | | | ≤ TAE | | |
| Receive timing offset to Cell2 Note 5 | µs | - | | | - | | | 33 | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Note 5: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

### A.8.23.24.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during the SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T2 interruption of PSCell during the SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

During T3 interruption of PSCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than 1ms.

The interruption of PSCell shall not be more than 1ms.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.23.25 E-UTRAN FDD-FDD DC activation and deactivation of known SCell in Non-DRX in asynchronous DC

### A.8.23.25.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation requirements specified in clause 7.18 for Dual Connectivity, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.23.25-1 and cell-specific parameters in A.8.23.25-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 2 (PSCell) on radio channel 2, but is not aware of Cell 3 (SCell1 in MCG) on radio channel 3 (SCC1). The UE is only monitoring the PCC and the frequency of PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of SCell1.

The point in time at which a MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell1 at latest in asubframe (m+24). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell and PSCell interruption due to activation of SCell1 shall not occur outside subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, where n is 4 or 9. is received at the UE antenna connector. The UE shall carry out deactivation of SCell1 at latest in subframe (n+8), and any PCell and PSCell interruption due to the deactivation of the SCell shall not occur outside subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.23.25-1: General test parameters for E-UTRAN FDD-FDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | PCell on RF channel number 1. |
| Configured PScell | | Cell 2 | PSCell on RF channel number 2. |
| Deconfigured SCell in MCG | | Cell 3 | Deconfigured SCell in MCG on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on the frequency of PSCell. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC1. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and PSCell shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.23.25-2: Cell specific test parameters for E-UTRAN FDD-FDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | | |
| PHICH_RA | dB | | | | | | | | | |
| PHICH_RB | dB | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | | 17 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | | -87 | | |

| | | | | |
|---|---|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Receive timing offset to Cell1 Note 5 | μs | - | 500 | ≤ TAE |
| Receive timing offset to Cell2 Note 5 | μs | - | - | 500 |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Receive time difference between subframe boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

### A.8.23.25.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+10) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during the SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T2 interruption of PSCell during the SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

During T3 interruption of PSCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than 1ms.

The interruption of PSCell shall not be more than 2ms.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.23.26 E-UTRAN TDD-TDD DC activation and deactivation of known SCell in Non-DRX in synchronous DC

### A.8.23.26.1 Test Purpose and Environment

The purpose of this test is to verify that SCell activation and deactivation requirements specified in clause 7.18 for Dual Connectivity, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.23.26-1 and cell-specific parameters in A.8.23.26-2 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, each with one cell. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and Cell 2 (PSCell) on radio channel 2, but is not aware of Cell 3 (SCell1 in MCG) on radio channel 3 (SCC1). The UE is only monitoring the PCC and the frequency of PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell1 becomes configured on SCC1. The UE now starts monitoring also the SCC1. The test equipment sends a MAC message for activation of the SCell1.

The point in time at which a MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell1 at latest in asubframe (m+24). The UE shall start reporting CSI for SCell1 in subframe in (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell and PSCell interruption due to activation of the SCell shall not occur outside subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of SCell1, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell1 at latest in subframe (n+8), and any PCell and PSCell interruption due to the deactivation of the SCell shall not occur outside subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation and deactivation of SCell1, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell1 activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell1 deactivation command is sent until CQI reporting for SCell1 is discontinued.

**Table A.8.23.26-1: General test parameters for E-UTRAN TDD-TDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | PCell on RF channel number 1. |
| Configured PScell | | Cell 2 | PSCell on RF channel number 2. |
| Deconfigured SCell in MCG | | Cell 3 | Deconfigured SCell in MCG on RF channel number 3. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCells every second subframe |
| Cell-individual offset for cells on RF channel number 1 | dB | 0 | Individual offset for cells on PCC. |
| Cell-individual offset for cells on RF channel number 2 | dB | 0 | Individual offset for cells on the frequency of PSCell. |
| Cell-individual offset for cells on RF channel number 3 | dB | 0 | Individual offset for cells on SCC1. |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| T1 | s | 7 | During this time the PCell and PSCell shall be known and the SCell1 configured and detected. |
| T2 | s | 1 | During this time the UE shall activate the SCell1. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell1. |

**Table A.8.23.26-2: Cell specific test parameters for E-UTRAN TDD-TDD DC activation and deactivation of known SCell in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 | | | Cell 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | | 3 | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | |

| OCNG Patterns | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP. 7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP. 7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP. 8 TDD |
|---|---|---|---|---|
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 | 17 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | 17 | 17 |
| RSRP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| SCH_RP Note 3 | dBm/15 kHz | -87 | -87 | -87 |
| Io Note 3 | dBm/Ch BW | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) | -59.13+10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Receive timing offset to Cell1 Note 5 | µs | - | 33 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | N/A | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: $E_s/I_{ot}$, RSRP, SCH_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.23.26.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell1 in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell1 with non-zero CQI index at latest in a subframe (m+24).

During T3 the UE shall stop sending CSI reports for SCell1 at latest in a subframe (n+8).

During T2 interruption of PCell during the SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T2 interruption of PSCell during the SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 interruption of PCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

During T3 interruption of PSCell during the SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than 1ms.

The interruption of PSCell shall not be more than 1ms.

All of the above test requirements shall be fulfilled in order for the observed SCell1 activation delay and SCell1 deactivation delay to be counted as correct. The rate of correct observed SCell1 activation delay and SCell1 deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+24) then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.23.27 E-UTRAN FDD-FDD DC event triggered reporting under deactivated SCell with PCell and PSCell interruption in non-DRX in synchronous DC

## A.8.23.27.1 Test Purpose and Environment

The purpose of this test is to verify that in FDD-FDD DC the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.8.8 while at the same time fulfilling the requirement on interruption rate stated in clause 7.12.

In this test case there are three cells: Cell1, Cell2, Cell3 and Cell4. Cell 1 is the PCell on the FDD primary component carrier, Cell 2 is the configured PSCell on the FDD carrier 2, Cell 3 is the configured deactivated SCell on the FDD carrier 3 in MCG, and Cell 4 is the neighbour cell on carrier 3. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of Cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell and PSCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

The test parameters are given in Table A.8.23.27.1-1 and Table A.8.23.27.1-2 below.

**Table A.8.23.27.1-1: General test parameters for E-UTRAN FDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured PSCell | | | Cell 2 | Configured PSCell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 1280 | |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |

**Table A.8.23.27.1-2: Cell specific test parameters for E-UTRAN FDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD 10MHz: R.3 FDD 20MHz: R.6 FDD | 5MHz: R.7 FDD 10MHz: R.3 FDD 20MHz: R.6 FDD | - | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | |
| OCNG Patterns defined | | 5MHz: OP.20 FDD 10MHz: OP.10 FDD 20MHz: OP.17 FDD | 5MHz: OP.20 FDD 10MHz: OP.10 FDD 20MHz: OP.17 FDD | 5MHz: OP.16 FDD 10MHz: OP.2 FDD 20MHz: OP.12 FDD | | 5MHz: OP.16 FDD 10MHz: OP.2 FDD 20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | 0 | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | -101 | -101 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 16 | 16 | 16 | -0.11 | -infinity | -0.11 |
| RSRP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| Io Note 3 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | |
| Propagation Condition | | ETU70 | ETU70 | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | 33 | 0 | | 3 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | N/A | ≤ TAE | | N/A | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.23.27.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell and PSCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs on the PCell and at least 99.5% of all expected ACK/NACKs on the PSCell shall be transmitted by the UE. Each interruption length shall not exceed 1 subframe.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.23.28 E-UTRAN FDD-FDD DC event triggered reporting under deactivated SCell with PCell and PSCell interruption in non-DRX in asynchronous DC

## A.8.23.28.1 Test Purpose and Environment

The purpose of this test is to verify that in FDD-FDD DC the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.8.8 while at the same time fulfilling the requirement on interruption rate stated in clause 7.12.

In this test case there are three cells: Cell1, Cell2, Cell3 and Cell4. Cell 1 is the PCell on the FDD primary component carrier, Cell 2 is the configured PSCell on the FDD carrier 2, Cell 3 is the configured deactivated SCell on the FDD carrier 3 in MCG, and Cell 4 is the neighbour cell on carrier 3. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of Cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell and PSCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

The test parameters are given in Table A.8.23.28.1-1 and Table A.8.23.28.1-2 below.

**Table A.8.23.28.1-1: General test parameters for E-UTRAN FDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured PSCell | | | Cell 2 | Configured PSCell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 1280 | |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |

**Table A.8.23.28.1-2: Cell specific test parameters for E-UTRAN FDD-FDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | - | | - | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | |
| OCNG Patterns defined | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | |
| PBCH_RA | dB | 0 | 0 | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | -101 | -101 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 16 | 16 | 16 | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 16 | 16 | 16 | -0.11 | -infinity | -0.11 |
| RSRP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | -85 | -85 | -85 | -infinity | -85 |
| Io Note 3 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | |
| Propagation Condition | | ETU70 | ETU70 | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | 500 | 0 | | 3 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | N/A | ≤ TAE | | N/A | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

## A.8.23.28.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell and PSCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs on the PCell and at least 99.5% of all expected ACK/NACKs on the PSCell shall be transmitted by the UE. Each interruption length shall not exceed 1subframes on PCell and 2 subframes on PSCell, respectively.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.23.29 E-UTRAN TDD-TDD DC event triggered reporting under deactivated SCell with PCell and PSCell interruption in non-DRX in synchronous DC

### A.8.23.29.1 Test Purpose and Environment

The purpose of this test is to verify that in TDD-TDD DC the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.8.8 while at the same time fulfilling the requirement on interruption rate stated in clause 7.12.

In this test case there are three cells: Cell1, Cell2, Cell3 and Cell4. Cell 1 is the PCell on the TDD primary component carrier, Cell 2 is the configured PSCell on the TDD carrier 2, Cell 3 is the configured deactivated SCell on the TDD carrier 3 in MCG, and Cell 4 is the neighbour cell on carrier 3. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used. The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of Cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. PDCCH indicating a new transmission on the PCell and PSCell shall be sent continuously to ensure that the UE sends ACK/NACKs throughout the test.

The test parameters are given in Table A.8.23.29.1-1 and Table A.8.23.29.1-2 below.

**Table A.8.23.29.1-1: General test parameters for E-UTRAN TDD-TDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured PSCell | | | Cell 2 | Configured PSCell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3. |
| CP length | | | Normal | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in TDD cells |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in TDD cells |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.11.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Cell-individual offset for cells on RF channel number 1 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on secondary component carrier. |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle (measCycleSCell) | | ms | 1280 | |

| | | | |
|---|---|---|---|
| T1 | s | 5 | During this time the UE shall be aware of cells 1, 2 and 3 but not cell 4. |
| T2 | s | ≤30 | UE shall report Event A6 within 25.6s (20×scellMeasCycle) |

**Table A.8.23.29.1-2: Cell specific test parameters for E-UTRAN TDD-TDD CA Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX with PCell in FDD**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| PDSCH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | | - | |
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | |
| OCNG Patterns defined | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -101 | | -101 | | -101 | | | |
| $\hat{E}_s/N_{oc}$ | dB | 16 | | 16 | | 16 | 16 | -infinity | 16 |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 16 | | 16 | | 16 | -0.11 | -infinity | -0.11 |
| RSRP Note 3 | dBm/15 kHz | -85 | | -85 | | -85 | -85 | -infinity | -85 |
| SCH_RP Note 3 | dBm/15 kHz | -85 | | -85 | | -85 | -85 | -infinity | -85 |
| Io Note 3 | dBm/Ch BW | -57.11 +10log ($N_{RB,c}$ /50) | | -57.11 +10log ($N_{RB,c}$ /50) | | -57.11 +10log ($N_{RB,c}$ /50) | -54.15 +10log ($N_{RB,c}$ /50) | Specified in columns for Cell 3 | |
| Propagation Condition | | ETU70 | | ETU70 | | ETU70 | | ETU70 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | | 33 | | 0 | | 3 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | N/A | | ≤ TAE | | N/A | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.8.23.29.2 Test Requirements

The UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 25.6s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell and PSCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs on the PCell and at least 99.5% of all expected ACK/NACKs on the PSCell shall be transmitted by the UE. Each interruption length shall not exceed 1 subframe.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.24 Proximity-based Services

### A.8.24.1 E-UTRAN FDD - Initiation/Cease of SLSS Transmission with ProSe Direct Discovery

The purpose of this test is to verify the requirements related to the maximum evaluation time allowed to initiate and cease SLSS transmissions defined in clause 8.10.2.1. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN. This test is applicable for a UE capable of ProSe Direct Discovery and also SLSS transmission and reception (indicated using *disc-SLSS*).

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.8.24.1.1-1. Table A.8.24.1.1-2 and Table A.8.24.1.1-3 below. There is one active cell (PCell) in this test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting SLSS. During T2, the RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate SLSS transmissions. During T3, the RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease SLSS transmissions.

#### A.8.24.1.1 Test Purpose and Environment

**Table A.8.24.1.1-1: Test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| Layer 3 filtering | | Disabled | L3 filtering is not used |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.8.24.1.1-2: ProSe Direct Discovery configuration for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| networkControlledSyncTx | | Not configured | |
| syncTxThreshIC | dBm/15 kHz | -95 | In SIB19 |

**Table A.8.24.1.1-3: Cell specific test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5 | | |
| OCNG Pattern (defined in clause A.3.2) | | OP.16 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | -4.5 | 4.5 |
| RSRP Note3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| SCH_RP Note 3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.8.24.1.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 2.24 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 2.24 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + *discPeriod*,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 1.92 sec (see Table 8.10.2.1-1 in clause 8.10.2.1) for the parameters in this test;

*discPeriod* is the discovery period (set as 320ms in this test).

## A.8.24.2 E-UTRAN TDD - Initiation/Cease of SLSS Transmission with ProSe Direct Discovery

The purpose of this test is to verify the requirements related to the maximum evaluation time allowed to initiate and cease SLSS transmissions defined in clause 8.10.2.1. In the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN. This test is applicable for a UE capable of ProSe Direct Discovery and also SLSS transmission and reception (indicated using *disc-SLSS*).

For this test, the UE is triggered by the test loop function or the upper layers to announce ProSe Direct Discovery.

The test parameters are given in Table A.8.24.2.1-1. Table A.8.24.2.1-2 and Table A.8.24.2.1-3 below. There is one active cell (PCell) in this test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting SLSS. During T2, the RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate SLSS transmissions. During T3, the RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease SLSS transmissions.

### A.8.24.2.1 Test Purpose and Environment

**Table A.8.24.2.1-1: Test parameters for initiation/cease of SLSS transmissions test for E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | Only one TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Active cell | | Cell 1 | E-UTRA TDD Cell1 on RF channel number 1 |
| Uplink/Downlink Configuration | | Config 0 | |
| Special Subframe Configuration | | 6 | |
| CP length of Cell 1 | | Normal | |
| Layer 3 filtering | | Disabled | L3 filtering is not used |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.8.24.1.1-2: ProSe Direct Discovery configuration for initiation/cease of SLSS transmissions test for E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| ProSe Direct Discovery resource pool configuration | | As specified in Table A.3.12.4-3 (Configuration #3) | IE values unless specified otherwise in this test. |
| networkControlledSyncTx | | Not configured | |
| syncTxThreshIC | dBm/15 kHz | -95 | In SIB19 |

**Table A.8.24.2.1-3: Cell specific test parameters for initiation/cease of SLSS transmissions test for E-UTRAN TDD**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 5 | | |
| OCNG Pattern (defined in clause A.3.2) | | OP.10 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |

| | | | | |
|---|---|---|---|---|
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | -4.5 | 4.5 |
| RSRP Note3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| SCH_RP Note 3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.8.24.2.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 2.24 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 2.24 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + *discPeriod*,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 1.92 sec (see Table 8.10.2.1-1 in clause 8.10.2.1) for the parameters in this test;

*discPeriod* is the discovery period (set as 320ms in this test).

## A.8.24.3 E-UTRAN FDD - Initiation/Cease of SLSS Transmission with ProSe Direct Communication

The purpose of this test is to verify that the ProSe UE meets the requirements related to the maximum evaluation time allowed to initiate and cease SLSS transmissions defined in clause 8.10.2.2. This test is applicable for a UE capable of ProSe Direct CommunicationIn the test the UE under test is configured for ProSe operation only on PCell and also the UE is configured only for PCell for WAN.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A.8.24.3.1-1, Table A.8.24.3.1-2 and Table A.8.24.3.1-3 below. There is one active cell (PCell) in this test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting SLSS. During T2, the RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate SLSS transmissions. During T3, the RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease SLSS transmissions.

### A.8.24.3.1 Test Purpose and Environment

**Table A.8.24.3.1-1: Test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | Only one FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 1 |
| CP length of Cell 1 | | Normal | |
| Layer 3 filtering | | Disabled | L3 filtering is not used |
| drx-Configuration | | DRX_P1 | As specified in Table A.3.12.2-1 |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.8.24.3.1-2: ProSe Direct Communication configuration for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | UL carrier frequency |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| ProSe Direct Communication configuration | | As specified in Table A.3.12.5-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| networkControlledSyncTx | | Not configured | |
| syncTxThreshIC | dBm/15 kHz | -95 | In SIB18 |

**Table A.8.24.3.1-3: Cell specific test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ Note 4 | MHz | 5 or 10 | | |
| OCNG Patterns defined in A.3.2.1.2 Note 4 | | 5MHz: OP.16 FDD<br>10 MHz: OP.2 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | -4.5 | 4.5 |
| RSRP Note3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| SCH_RP Note 3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| Propagation Condition | | AWGN | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | This test is according to the principle defined in section A.3.12.3. |

### A.8.24.3.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 1.96 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 1.96 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 1.92 sec (see Table 8.10.2.1-1 in clause 8.10.2.1) for the parameters in this test;

SLSS period is set to 40ms.

## A.8.25 E-UTRAN-WLAN Measurements

### A.8.25.1 E-UTRAN FDD-WLAN Event Triggered Reporting in non-DRX under AWGN

#### A.8.25.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event W1 (WLAN becomes better than a threshold) for unknown cell (unknown neighbour AP) and event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold) for known cell (serving AP) defined in TS 36.331 [2] within the requirements stated in clause 8.1.2.4.19.

The test parameters are given in Tables A.8.25.1.1-1 and A.8.25.1.1-2 below. In the tests there are two cells, cell1 (E-UTRAN FDD) and cell2 (WLAN AP). It is indicated to the UE in the measurement control information that event-triggered reporting with Events W1 (for cell2) and W3 (for cell2) are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell1. At the beginning of T2 the transmission power of cell 2 is increased to a level, which shall result in reporting of Event W1. At the beginning of T3 the transmission power of cell 2 is decreased to a level, which shall result in reporting of Event W3.

**Table A.8.25.1.1-1: General test parameters for E-UTRAN FDD-WLAN event triggered reporting under AWGN in non-DRX**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | Cell 2 (AP) | Cell 2 (WLAN AP) is on WLAN RF channel number 1. |
| CP length | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | 1 | One E-UTRA FDD carrier frequency is used. |
| WLAN Channel Number | | 1 | One WLAN carrier frequency is used. |
| WLAN measurement quantity | | WLAN RSSI | |
| WLAN beacon frame transmission period | ms | 102.5 | |
| DRX | | OFF | |
| W1 Hysteresis | dB | 0 | Hysteresis for evaluation of event W1. |

| | | | | |
|---|---|---|---|---|
| | Threshold WLAN RSSI | dBm | -70 | Actual WLAN RSSI threshold for event W1. Needs to take absolute accuracy tolerance in section 9.7.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| W3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event W3. |
| | Threshold WLAN RSSI | dBm | -65 | Actual WLAN RSSI threshold for event W3. Needs to take absolute accuracy tolerance in section 9.7.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| T1 | | s | 5 | During this time the cell1 shall be known to the UE; but cell2 shall be unknown to the UE. |
| T2 | | s | ≤ 40 | UE should report Event W1 for cell2 within 30 s. |
| T3 | | s | 3 | UE should report Event W3 for cell2 within 0.5 s. |

**Table A.8.25.1.1-2: Cell specific test parameters for E-UTRAN FDD-WLAN event triggered reporting under AWGN in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 (WLAN AP) | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | N/A | | |
| WLAN RF channel Number | | N/A | | | 1 | | |
| $BW_{channel}$ | | 10MHz | | | 20 MHz | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 FDD | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 FDD | | | N/A | | |
| OCNG Patterns | | OP.1 FDD | | | N/A | | |
| PBCH_RA | dB | 0 | | | N/A | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc1}$ Note 2 | dBm/15 KHz | -98 | | | N/A | | |
| $N_{oc2}$ Note 3 | dBm/20 MHz | N/A | | | -75 | | |
| $\hat{E}_s/N_{oc1}$ | dB | 3 | 3 | 3 | N/A | | |
| $\hat{E}_s/I_{ot}$ Note 4 | dB | 3 | 3 | 3 | | | |
| RSRP Note 4 | dBm/15 kHz | -95 | -95 | -95 | | | |
| SCH_RP Note 4 | dBm/15 kHz | -95 | -95 | -95 | | | |
| Io Note 3 | dBm/Ch BW | -65.5 | -65.5 | -65.5 | | | |
| WLAN RSSI Note 4 | dBm/20 MHz | | | | -infinity | -65 | -70 |
| WLAN SNR | dB | | | | -infinity | 9.54 | 3.35 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | - | | |
| Timing offset to Cell 1 | ms | 0 | | | 3 | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc1}$ to be fulfilled.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over the bandwidth and time and shall be modelled as AWGN of appropriate power for $N_{oc2}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP, Io and WLAN RSSI have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.25.1.2 Test Requirements

The UE shall send one Event W1 triggered measurement report, with a measurement reporting delay less than 30 seconds from the beginning of time period T2.

The UE shall send one Event W3 triggered measurement report, with a measurement reporting delay less than 500 ms from the beginning of time period T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.25.2 E-UTRAN TDD-WLAN Event Triggered Reporting in non-DRX under AWGN

### A.8.25.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event W1 (WLAN becomes better than a threshold) for unknown cell (unknown neighbour AP) and event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold) for known cell (serving AP) defined in TS 36.331 [2] within the requirements stated in clause 8.1.2.4.19.

The test parameters are given in Tables A.8.25.2.1-1 and A.8.25.2.1-2 below. In the tests there are two cells, cell1 (E-UTRAN TDD) and cell2 (WLAN AP). It is indicated to the UE in the measurement control information that event-triggered reporting with Events W1 (for cell2) and W3 (for cell2) are used. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. During T1 the UE shall not have any information on cell1. At the beginning of T2 the transmission power of cell 2 is increased to a level, which shall result in reporting of Event W1. At the beginning of T3 the transmission power of cell 2 is decreased to a level, which shall result in reporting of Event W3.

**Table A.8.25.2.1-1: General test parameters for E-UTRAN TDD-WLAN event triggered reporting under AWGN in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Active cell | | | Cell 1 | Cell 1 is on E-UTRA RF channel number 1. |
| Neighbour cell | | | Cell 2 (AP) | Cell 2 (WLAN AP) is on WLAN RF channel number 1. |
| CP length | | | Normal | Applicable to cell 1 |
| E-UTRA RF Channel Number | | | 1 | One E-UTRA TDD carrier frequency is used. |
| WLAN Channel Number | | | 1 | One WLAN carrier frequency is used. |
| WLAN measurement quantity | | | WLAN RSSI | |
| WLAN beacon frame transmission period | | ms | 102.5 | |
| DRX | | | OFF | |
| Special subframe configuration | | | 6 | As specified in table 4.2-1 in TS 36.211 [16]. The same configuration applies to all cells. |
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211 [16]. The same configuration applies to all cells |
| W1 | Hysteresis | dB | 0 | Hysteresis for evaluation of event W1. |
| | Threshold WLAN RSSI | dBm | -70 | Actual WLAN RSSI threshold for event W1. Needs to take absolute accuracy tolerance in section 9.7.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| W3 | Hysteresis | dB | 0 | Hysteresis for evaluation of event W3. |
| | Threshold WLAN RSSI | dBm | -65 | Actual WLAN RSSI threshold for event W3. Needs to take absolute accuracy tolerance in section 9.7.1 into account plus margin. |
| | Time To Trigger | s | 0 | |
| T1 | | s | 5 | During this time the cell1 shall be known to the UE; but cell2 shall be unknown to the UE. |
| T2 | | s | ≤ 40 | UE should report Event W1 for cell2 within 30 s. |
| T3 | | s | 3 | UE should report Event W3 for cell2 within 0.5 s. |

**Table A.8.25.2.1-2: Cell specific test parameters for E-UTRAN TDD-WLAN event triggered reporting under AWGN in non-DRX**

| Parameter | Unit | Cell 1 | | | Cell 2 (WLAN AP) | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | N/A | | |
| WLAN RF channel Number | | N/A | | | 1 | | |
| $BW_{channel}$ | | 10MHz | | | 20 MHz | | |
| PDSCH parameters: DL Reference Measurement Channel | | R.0 TDD | | | N/A | | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | R.6 TDD | | | N/A | | |
| OCNG Patterns | | OP.1 TDD | | | N/A | | |
| PBCH_RA | dB | 0 | | | N/A | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc1}$ Note 2 | dBm/15 KHz | -98 | | | N/A | | |
| $N_{oc2}$ Note 3 | dBm/20 MHz | N/A | | | -75 | | |
| $\hat{E}_s/N_{oc1}$ | dB | 3 | 3 | 3 | N/A | | |
| $\hat{E}_s/I_{ot}$ Note 4 | dB | 3 | 3 | 3 | | | |
| RSRP Note 4 | dBm/15 kHz | -95 | -95 | -95 | | | |
| SCH_RP Note 4 | dBm/15 kHz | -95 | -95 | -95 | | | |
| Io Note 3 | dBm/Ch BW | -65.5 | -65.5 | -65.5 | | | |
| WLAN RSSI Note 4 | dBm/20 MHz | N/A | N/A | N/A | -infinity | -65 | -70 |
| WLAN SNR | dB | N/A | N/A | N/A | -infinity | 9.54 | 3.35 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | - | | |
| Timing offset to Cell 1 | ms | 0 | | | 3 | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc1}$ to be fulfilled.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over the bandwidth and time and shall be modelled as AWGN of appropriate power for $N_{oc2}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP, Io and WLAN RSSI have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

### A.8.25.2.2 Test Requirements

The UE shall send one Event W1 triggered measurement report, with a measurement reporting delay less than 30 seconds from the beginning of time period T2.

The UE shall send one Event W3 triggered measurement report, with a measurement reporting delay less than 500 ms from the beginning of time period T3.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90% for each of the events.

NOTE: The actual overall delays measured in the tests may be up to $2\times TTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.26 Frame Structure 3 (FS3)

## A.8.26.1 E-UTRAN FDD-FS3 Activation and deactivation of known FS3 SCell with FDD PCell in non-DRX

### A.8.26.1.1 Test Purpose and Environment

The purpose of this test is to verify that the LAA SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.26.1.1-1 and cell-specific parameters in A.8.26.1.1-2 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell on the FDD primary component (RF Channel 1), Cell2 is deactivated SCell on the secondary component (RF Channel 2) for frame structure 3. Cell 1 has constant signal levels throughout the test, and Cell 2 transmits discovery signal with LBT model.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Before the test starts the UE is connected to Cell1 on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m which is an even number, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe m+ $T_{activate_basic_FS3}$, where $T_{activate_basic_FS3}$ is specified in section 7.7.10. The UE shall start reporting CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+9).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a subframe (n+8), and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+9).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.26.1.1-1: General test parameters for known LAA SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |

| | | | |
|---|---|---|---|
| Configured deactivated LAA FS3 SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every second subframe |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| laa-SCellSubframeConfig | | 00000000 | No MBSFN subframe. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configured and detected. |
| T2 | s | > $T_{activate_basic_FS3}$ | During this time the UE shall activate the SCell, $T_{activate_basic_FS3}$ is specified in section 7.7.10. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.26.1.1-2: Cell specific test parameters for E-UTRAN FDD known LAA SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 20 | | |
| LBT model | | - | | | A.3.17 | | |
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | - | | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | | OP.14 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -104 | | | -104 | | |
| $\hat{E}_s/N_{oc}$ | dB | 17 | | | 17 | | |
| RSRP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| $\hat{E}_s/I_{ot}$ Note 3 | dB | 17 | | | 17 | | |
| SCH_RP Note 3 | dBm/15 kHz | -87 | | | -87 | | |
| Io Note3 | dBm/Ch BW | -59.1+10log($N_{RB,c}$ /50) | | | -56.1 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x2 | | | 1x2 | | |
| timing offset to cell1 | μs | - | | | 0 | | |
| Time alignment error relative to cell 1 Note 5 | μs | - | | | ≤ TAE | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. |

### A.8.26.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+10) if the suframe (m+8) was subject to interruption. Whether CSI report in subframe (m+8) was interrupted or not is checked by monitoring ACK/NACK sent in PCell in subframe (m+8).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+ $T_{activate_basic_FS3}$) ms, *L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time.

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (n+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+9).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+9).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+ $T_{activate_basic_FS3}$)ms, *L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time, then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

## A.8.26.2 E-UTRAN TDD-FS3 Activation and deactivation of known FS3 SCell with TDD PCell in non-DRX

### A.8.26.2.1 Test Purpose and Environment

The purpose of this test is to verify that the LAA SCell activation and deactivation times are within the requirements stated in section 7.7, when the SCell is known by the UE at the time of activation.

The test parameters are given in Tables A.8.26.2.1-1 and cell-specific parameters in A.8.26.2.1-2 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell on the TDD primary component (RF Channel 1), Cell2 is deactivated SCell on the secondary component (RF Channel 2) for frame structure 3. Cell 1 has constant signal levels throughout the test, and Cell 2 transmits discovery signal with LBT model.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. Before the test starts the UE is connected to Cell1 on radio channel 1 (PCC) but is not aware of Cell 2 on radio channel 2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2 (SCC). The UE now starts monitoring also the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a subframe # denoted m, where m is 4 or 9, defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in subframe m+ $T_{activate_basic_FS3}$, where $T_{activate_basic_FS3}$ is specified in section 7.7.10. The UE shall start reporting

CSI in subframe (m+8) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the subframes (m+5) to (m+11).

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a subframe # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell and any PCell interruption due to the deactivation shall occur in the subframes (n+5) to (n+11).

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the subframes from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the subframes from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

**Table A.8.26.2.1-1: General test parameters for known LAA SCell activation case**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated LAA FS3 SCell | | Cell 2 | Configured deactivated secondary cell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | Continuous monitoring of primary cell |
| CQI/PMI periodicity and offset configuration index | | 0 | CQI reporting for SCell every UL subframe |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| SCell measurement cycle (measCycleSCell) | ms | 320 | |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| laa-SCellConfiguration | | 00000000 | No MBSFN subframe. |
| T1 | s | 7 | During this time the PCell shall be known and the SCell configuredand detected. |
| T2 | s | > $T_{activate_basic_FS3}$ | During this time the UE shall activate the SCell. |
| T3 | s | 1 | During this time the UE shall deactivate the SCell. |

**Table A.8.26.2.1-2: Cell specific test parameters for E-UTRAN TDD known LAA SCell activation**

| Parameter | Unit | Cell 1 | | | Cell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | 2 | | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | 20 | | |
| Uplink-downlink configuration[Note1] | | 1 | | | - | | |
| Special subframe configuration[Note2] | | 6 | | | - | | |
| LBT model | | - | | | A.3.17 | | |
| PDSCH parameters defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | | - | | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | | - | | |
| OCNG Patterns defined in A.3.2.1 and A.3.2.2. | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | | OP.14 FDD | | |
| PBCH_RA | dB | 0 | | | 0 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |

| | | | |
|---|---|---|---|
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 3 | dB | | |
| OCNG_RB Note 3 | dB | | |
| $N_{oc}$ Note 4 | dBm/15 kHz | -104 | -104 |
| $\hat{E}_s/N_{oc}$ | dB | 17 | 17 |
| RSRP Note 5 | dBm/15 kHz | -87 | -87 |
| $\hat{E}_s/I_{ot}$ Note 5 | dB | 17 | 17 |
| SCH_RP Note 5 | dBm/15 kHz | -87 | -87 |
| Io Note 5 | dBm/Ch BW | -59.1+10log($N_{RB,c}$ /50) | -56.1 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x2 | 1x2 |
| timing offset to cell1 | μs | - | 0 |
| Time alignment error relative to cell 1 Note 7 | μs | - | ≤ TAE |

Note 1: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 2: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 3: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 5: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 6: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a subframe (m+8), or in a subframe (m+9) if the subframe (m+8) was subject to interruption, or in a subframe (m+13) if the subframes (m+8) and (m+9) were subject to interruption when an intra-band SCell is activated. Whether first CSI report was interrupted or not is checked by monitoring ACK/NACK sent in PCell at the same time as the first CSI report.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a subframe (m+ $T_{activate_basic_FS3}$)ms, *L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time.

During T3 the UE shall stop sending CSI reports for SCell at latest in a subframe (m+8).

During T2 interruption of PCell during SCell activation shall not happen outside the subframes (m+5) to (m+11).

During T3 interruption of PCell during SCell deactivation shall not happen outside the subframes (n+5) to (n+11).

The interruption of PCell shall not be more than the values specified for intra-band CA and inter-band CA in Section 7.8.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a subframe (m+ $T_{activate_basic_FS3}$)ms, *L* is the number of times the discovery signal occasion is not available at the UE during the SCell activation time, then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

# A.8.26.3 E-UTRAN FDD-FS3 Event triggered reporting on deactivated FS3 SCell and FDD PCell interruption in non-DRX

## A.8.26.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.12.2.4 while at the same time fulfilling the requirement on interruption rate. This test is applicable to UEs that support a maximum of 1 FS3 SCell, ie UEs that support a maximum of 2, 3, or 4 FS3 Scells are not required to pass this test.

The test parameters are given in Table A.8.26.3.1-1 and A.8.26.3.1-2. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used.

In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell on the FDD primary compenent (RF Channel 1), Cell2 is deactivated SCell on the secondary component (RF Channel 2) for frame structure 3, and Cell3 is the neighbour cell on the secondary component (RF Channel 3) for frame structure 3. Cell 2 and Cell 3 transmit discovery signal in every discovery signal occasion.

The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PCell is indicated by the network using IE allowInterruptions and PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/ NACKs throughout the test.

**Table A.8.26.3.1-1: General test parameters for Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2 for frame structure 3. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2 for frame structure 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.18.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 160 | *measCycleSCell* as specified in TS 36.331 |
| DMTC period | | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| subframeStartPosition | | | s0 | Discovery signal starts from subframe #0 |
| laa-SCellSubframeConfig | | | 00000000 | No MBSFN subframe. |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤5 | UE should report Event A6 within 4 s (25×measCycleSCell) |

**Table A.8.26.3.1-2: Cell specific test parameters for Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50 | | 20 | | 20 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 20MHz: $N_{RB,c}$ = 100 | | | | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | - | | - | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | - | | - | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | OP.14 FDD | | OP.14 FDD | |
| IE allowInterruptions | | True | | - | | - | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 13 | 13 | 13 | 13 | -Infinity | 13 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 13 | 13 | 13 | -0.21 | -Infinity | -0.21 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| Io Note4 | dBm/Ch BW | -57.01+10log($N_{RB,c}$ /50) | | -54.00 | -51.09 | Specified in columns for Cell 2 | |
| Propagation Condition | | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | | 1x2 | |
| timing offset to cell1 | µs | - | | 0 | | 0 | |
| timing offset to cell2 | µs | | | - | | 0 | |
| Time alignment error relative to cell 1 Note 5 | µs | - | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 2 Note 5 | µs | | | - | | ≤ TAE | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.3.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 4s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.26.3A E-UTRAN FDD-TDD 3DL Event triggered reporting on deactivated FS3 SCell and FDD PCell interruption in non-DRX

## A.8.26.3A.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.12.2.4 while at the same time fulfilling the requirement on interruption rate. This test is applicable to UEs that support a 2, 3 or 4 FS3 SCells, ie UEs that support a maximum of 1 FS3 Scell are not required to pass this test.

The test parameters are given in Table A.8.26.3A.1-1 and A.8.26.3A.1-2. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used.

In the test there are three synchronous cells: Cell1, Cell2, Cell3 and Cell4. Cell1 is PCell on the FDD primary compenent (RF Channel 1), Cell2 is activated SCell on the secondary component (RF Channel 2) for frame structure 3, Cell3 is deactivated SCell on the secondary component (RF Channel 3) for frame structure 3, and Cell4 is the neighbour cell on the secondary component (RF Channel 3) for frame structure 3. Cell 2, Cell 3 and Cell 4 transmit discovery signal in every discovery signal occasion.

The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. PCell is indicated by the network using IE allowInterruptions and PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/ NACKs throughout the test.

**Table A.8.26.3A.1-1: General test parameters for FDD-TDD 3DL Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2,3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | | Cell 2 | Primary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 for frame structure 3. |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3 for frame structure 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.18.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 160 | *measCycleSCell* as specified in TS 36.331 |
| DMTC period | | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| subframeStartPosition | | | s0 | Discovery signal starts from subframe #0 |
| laa-SCellSubframeConfig | | | 00000000 | No MBSFN subframe. |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤10 | UE should report Event A6 within 8s |

**Table A.8.26.3A.1-2: Cell specific test parameters for FDD-TDD 3DL Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 20 | | 20 | | 20 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | | - | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | - | | - | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | OP.8 TDD | | OP.7 TDD | | OP.7 TDD | |
| IE allowInterruptions | | True | | - | | - | | - | |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | | | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 13 | 13 | 13 | 13 | 13 | 13 | -Infinity | 13 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 13 | 13 | 13 | 13 | 13 | -0.21 | -Infinity | -0.21 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 |
| Io Note4 | dBm/Ch BW | -57.01+10log($N_{RB,c}$/50) | | -57.01+10log($N_{RB,c}$/50) | | -54.00 | -51.09 | Specified in columns for Cell 2 | |
| Propagation Condition | | AWGN | | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | | 1x2 | | 1x2 | |
| timing offset to cell1 | µs | - | - | 0 | 0 | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | N/A | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.3A.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 8s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.4 E-UTRAN TDD-FS3 Event triggered reporting on deactivated FS3 SCell and TDD PCell interruption in non-DRX

### A.8.26.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.12.2.4 while at the same time fulfilling the requirement on interruption rate. This test is applicable to UEs that support a maximum of 1 FS3 SCell, ie UEs that support a maximum of 2, 3, or 4 FS3 Scells are not required to pass this test.

The test parameters are given in Table A.8.26.4.1-1 and A.8.26.4.1-2. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used.

In the test there are three synchronous cells: Cell1, Cell2 and Cell3. Cell1 is PCell on the TDD primary compenent (RF Channel 1), Cell2 is deactivated SCell on the secondary component (RF Channel 2) for frame structure 3, and Cell3 is the neighbour cell on the secondary component (RF Channel 3) for frame structure 3. Cell 2 and Cell 3 transmit discovery signal in every discovery signal occasion.

The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2, and due to usage of an offset this shall result in reporting of Event A6. PCell is indicated by the network using IE allowInterruptions and PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/ NACKs throughout the test.

**Table A.8.26.4.1-1: General test parameters for Event triggered reporting on LAA deactivated SCell with E-UTRAN TDD PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Configured deactivated SCell | | | Cell 2 | Configured deactivated secondary cell on RF channel number 2 for frame structure 3. |
| Neighbour cell | | | Cell 3 | Neighbor cell to be identified on RF channel number 2 for frame structure 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.18.2 into account plus margin. |
| | Report on leave | | False | |

| | | | |
|---|---|---|---|
| Time To Trigger | s | 0 | |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Filter coefficient | | 0 | L3 filtering is not used |
| SCell measurement cycle | ms | 160 | *measCycleSCell* as specified in TS 36.331 |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| subframeStartPosition | | s0 | Discovery signal starts from subframe #0 |
| laa-SCellSubframeConfig | | 00000000 | No MBSFN subframe. |
| T1 | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | s | ≤5 | UE should report Event A6 within 4 s (25×scellMeasCycle) |

**Table A.8.26.4.1-2: Cell specific test parameters for E-UTRAN TDD-TDD Event triggered reporting on configured but deactivated SCell with PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 20 | | 20 | |
| Uplink-downlink configuration[Note1] | | 1 | | - | | - | |
| Special subframe configuration[Note2] | | 6 | | - | | - | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | | - | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | - | | - | |
| OCNG Patterns defined in A.3.2.1 and A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | OP.14 FDD | | OP.14 FDD | |
| IE allowInterruptions | | True | | - | | - | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA[Note 3] | dB | | | | | | |
| OCNG_RB[Note 3] | dB | | | | | | |
| $N_{oc}$ [Note 5] | dBm/15 kHz | -98 | | -98 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 13 | 13 | 13 | 13 | -Infinity | 13 |
| RSRP [Note 6] | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / I_{ot}$ [Note 6] | dB | 13 | 13 | 13 | -0.21 | -Infinity | -0.21 |
| SCH_RP [Note 6] | dBm/15 kHz | -85 | -85 | -85 | -85 | -Infinity | -85 |
| Io [Note6] | dBm/Ch BW | -57.01+10log($N_{RB,c}$ /50) | | -54.00 | -51.09 | Specified in columns for Cell 2 | |
| Propagation Condition | | AWGN | | AWGN | | AWGN | |

| | | | | |
|---|---|---|---|---|
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| timing offset to cell1 | µs | - | 0 | 0 |
| timing offset to cell2 | µs | | - | 0 |
| Time alignment error relative to cell 1 Note 7 | µs | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | µs | | - | ≤ TAE |

Note 1: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 2: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 6: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.4.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 4s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.4A E-UTRAN TDD-TDD 3DL Event triggered reporting on deactivated FS3 SCell and FDD PCell interruption in non-DRX

### A.8.26.4A.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A6 (Neighbour becomes better than SCell) defined in TS 36.331 [2] within the requirements stated in clause 8.12.2.4 while at the same time fulfilling the requirement on interruption rate. This test is applicable to UEs that support a maximum of 1 FS3 SCell, ie UEs that support a maximum of 2, 3, or 4 FS3 Scells are not required to pass this test.

The test parameters are given in Table A.8.26.4A.1-1 and A.8.26.4A.1-2. It is indicated to the UE in the measurement control information that event-triggered reporting with Event A6 is used.

In the test there are three synchronous cells: Cell1, Cell2, Cell3 and Cell4. Cell1 is PCell on the TDD primary compenent (RF Channel 1), Cell2 is activated SCell on the secondary component (RF Channel 2) for frame structure 3, Cell3 is deactivated SCell on the secondary component (RF Channel 3) for frame structure 3, and Cell4 is the neighbour cell on the secondary component (RF Channel 3) for frame structure 3. Cell 2, Cell 3 and Cell 4 transmit discovery signal in every discovery signal occasion.

The test consists of two successive time periods, with duration of T1 and T2, respectively. During T1 the UE shall not have any information of cell 4. Immediately at beginning of T2 the transmission power of cell 4 is increased to same level as for cell 3, and due to usage of an offset this shall result in reporting of Event A6. PCell is indicated by the network using IE allowInterruptions and PDCCH indicating a new transmission on the PCell shall be sent continuously to ensure that the UE sends ACK/ NACKs throughout the test.

**Table A.8.26.4A.1-1: General test parameters for TDD-TDD 3DL Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2,3 | Three radio channels are used for this test |
| Active PCell | | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | | Cell 2 | Primary cell on RF channel number 2. |
| Configured deactivated SCell | | | Cell 3 | Configured deactivated secondary cell on RF channel number 3 for frame structure 3. |
| Neighbour cell | | | Cell 4 | Neighbor cell to be identified on RF channel number 3 for frame structure 3. |
| CP length | | | Normal | |
| DRX | | | OFF | Continuous monitoring of primary cell |
| A6 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A6. |
| | Offset | dB | -3 | Offset parameter for evaluation of event A6. Needs to take relative accuracy tolerance in clause 9.1.18.2 into account plus margin. |
| | Report on leave | | False | |
| | Time To Trigger | s | 0 | |
| Discovery signal occasion duration | | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Filter coefficient | | | 0 | L3 filtering is not used |
| SCell measurement cycle | | ms | 160 | *measCycleSCell* as specified in TS 36.331 |
| DMTC period | | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| subframeStartPosition | | | s0 | Discovery signal starts from subframe #0 |
| laa-SCellSubframeConfig | | | 00000000 | No MBSFN subframe. |
| T1 | | s | 5 | During this time the UE shall be aware of cells 1 and 2 but not cell 3. |
| T2 | | s | ≤10 | UE should report Event A6 within 8 s |

**Table A.8.26.4A.1-2: Cell specific test parameters for TDD-TDD 3DL Event triggered reporting on LAA deactivated SCell with E-UTRAN FDD PCell interruption in non-DRX**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 3 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 20 | | 20 | | 20 | |
| Uplink-downlink configuration[Note1] | | 1 | | 1 | | - | | - | |
| Special subframe configuration[Note2] | | 6 | | 6 | | - | | - | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | | - | |
| PCFICH/PDCCH/PHICH parameters defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | - | | - | |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | | OP.8 TDD | | OP.7 TDD | | OP.7 TDD | |
| IE allowInterruptions | | True | | - | | - | | - | |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | | | | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 13 | 13 | 13 | 13 | 13 | 13 | -Infinity | 13 |
| RSRP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 |
| $\hat{E}_s / I_{ot}$ Note 4 | dB | 13 | 13 | 13 | 13 | 13 | -0.21 | -Infinity | -0.21 |
| SCH_RP Note 4 | dBm/15 kHz | -85 | -85 | -85 | -85 | -85 | -85 | -Infinity | -85 |
| Io Note4 | dBm/Ch BW | -57.01+10log($N_{RB,c}$ /50) | | -57.01+10log($N_{RB,c}$ /50) | | -54.00 | -51.09 | Specified in columns for Cell 2 | |
| Propagation Condition | | AWGN | | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | 1x2 | | 1x2 | | 1x2 | | 1x2 | |
| timing offset to cell1 | μs | - | - | 0 | 0 | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | μs | - | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | N/A | N/A |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.4A.2 Test Requirements

The UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than 8s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The UE shall be scheduled on PCell continuously throughout the test. From the start of T1 until the measurement report is received during T2, at least 99.5% of all expected ACK/NACKs shall be transmitted by the UE.

For a test to be considered successful requirements on both event detection and percentage of transmitted ACK/NACKs have to be fulfilled simultaneously.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.5 E-UTRAN FDD-FS3 Intra-frequency event triggered reporting in non-DRX for CRS based discovery signal

### A.8.26.5.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in non-DRX requirements in clause 8.11.2. This test is applicable to UEs that support a maximum of 1 FS3 SCell, ie UEs that support a maximum of 2, 3, or 4 FS3 Scells are not required to pass this test.

The test parameters are given in Tables A.8.26.5.1-1and A.8.26.5.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are three cells: Cell 1, Cell 2, and Cell 3. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3. LBT model is applied on cell 3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.5.1-1: General test parameters for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.26.5.1-2: Cell specific test parameters for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | |
| LBT model | | - | | - | | A.3.17 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | R.1 FS3 | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | R.0 FS3 | | R.0 FS3 | |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | OP.13 FDD | | OP.14 FDD | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -1.455 | -infinity | -1.455 |
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log($N_{RB,c}$ /50) | -70.76+10log($N_{RB,c}$ /50) | -67.75 | -65.41 | Specified in columns for Cell 2 | |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | N/A | N/A |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

### A.8.26.5.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than (24+L)*40ms from the beginning of time period T2, where L is the number of configured discovery signal occasions which are not available due to the absence of the necessary radio signals from cell3.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.26.5A E-UTRAN FDD-FS3 Intra-frequency event triggered reporting in non-DRX for CRS based discovery signal with 2 SCells

## A.8.26.5A.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in non-DRX requirements in clause 8.11.2. This test is applicable to UEs that support a 2,3 or 4 FS3 SCells, ie UEs that support a maximum of 1 FS3 Scell are not required to pass this test.

The test parameters are given in Tables A.8.26.5A.1-1and A.8.26.5A.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are five cells: Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3 and Cell 4 is the activated SCell on the secondary component (RF Channel 3) for Frame Structure 3.

The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3 and 5. Immediately at beginning of T2 the transmission power of cell 3 and 5 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.5A.1-1: General test parameters for E-UTRAN FDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2,3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbour cell to be identified on RF channel number 2. |
| Active SCell | | Cell 4 | Configured activated secondary cell on RF channel number 3. |
| DMTC period | ms | 40 | Applies for cell 2,3 and 4 as specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | Applies for cell 2,3 and 4 as specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | Applies for cell 2,3, and 4 as specified in IE MeasDS-Config in TS 36.331 |
| LBT modelling | | | Not applied for any cell in the test |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |
| | | | |

**Table A.8.26.5A.1-2: Cell specific test parameters for E-UTRAN FDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | | Cell4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | | 3 |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | | 20 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz: 47-52 | | 47-52 | | 47-52 | | 47-52 |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.7 FDD<br>10MHz: R.3 FDD<br>20MHz: R.6 FDD | | R.0 FS3 | | - | | R.0 FS3 |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | R.0 FS3 | | R.0 FS3 | | R.0 FS3 |
| OCNG Patterns | | 5MHz: OP.20 FDD<br>10MHz: OP.10 FDD<br>20MHz: OP.17 FDD | | OP.13 FDD | | OP.14 FDD | | OP.13 FDD |
| PBCH_RA | dB | 0 | | 0 | | 0 | | 0 |
| PBCH_RB | dB | | | | | | | |
| PSS_RA | dB | | | | | | | |
| SSS_RA | dB | | | | | | | |
| PCFICH_RB | dB | | | | | | | |
| PHICH_RA | dB | | | | | | | |
| PHICH_RB | dB | | | | | | | |
| PDCCH_RA | dB | | | | | | | |
| PDCCH_RB | dB | | | | | | | |
| PDSCH_RA | dB | | | | | | | |
| PDSCH_RB | dB | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | | -104 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -1.455 | -infinity | -1.455 | 4 |
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log (NRB,c /50) | -70.76+10log (NRB,c /50) | -67.75 | -65.41 | -67.75 | -65.41 | -67.75 |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | | ETU30 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | | 1x2 Low |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | N/A | ≤ TAE | N/A | ≤ TAE | N/A |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP SCH_RP and Es/Iot levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.26.5A.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 1920ms from the beginning of time period T2.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.6 E-UTRAN TDD-FS3 Intra-frequency event triggered reporting in non-DRX for CRS based discovery signal

### A.8.26.6.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in non-DRX requirements in clause 8.11.2. This test is applicable to UEs that support a maximum of 1 FS3 SCell, ie UEs that support a maximum of 2, 3, or 4 FS3 Scells are not required to pass this test.

The test parameters are given in Tables A.8.26.6.1-1and A.8.26.6.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are three cells: Cell 1, Cell 2, and Cell 3. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3. LBT model is applied on cell 3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.6.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.26.6.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Special subframe configuration | | 6 | | - | | - | |
| Uplink-downlink configuration | | 1 | | - | | - | |
| LBT model | | - | | - | | A.3.17 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz:47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | R.0 FS3 | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | R.0 FS3 | | R.0 FS3 | |
| OCNG Patterns | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | OP.13 FDD | | OP.14 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log($N_{RB,c}$ /50) | -70.76+10log($N_{RB,c}$ /50) | -67.75 | -65.41 | Specified in columns for Cell 2 | |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | N/A | N/A |
| Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in | | | | | | | |

| | |
|---|---|
| | subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP, SCH_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 5: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. |

### A.8.26.6.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than (24+L)*40ms from the beginning of time period T2, where L is the number of configured discovery signal occasions which are not available due to the absence of the necessary radio signals from cell3.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.6A E-UTRAN TDD-FS3 Intra-frequency event triggered reporting in non-DRX for CRS based discovery signal with 2 SCells

### A.8.26.6A.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in non-DRX requirements in clause 8.11.2. This test is applicable to UEs that support a 2,3 or 4 FS3 SCells, ie UEs that support a maximum of 1 FS3 Scell are not required to pass this test.

The test parameters are given in Tables A.8.26.6A.1-1and A.8.26.6A.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are five cells. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3. andCell 4 is activated SCell on the secondary component (RF Channel 3) for Frame Structure 3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3. Immediately at beginning of T2 the transmission power of cell 3 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.6A.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2, 3 | Three radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| Active SCell | | Cell 4 | Configured activated secondary cell on RF channel number 3. |

| | | | |
|---|---|---|---|
| DMTC period | ms | 40 | Applies for cell 2,3 and 4 as specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | Applies for cell 2,3 and 4 as specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | Applies for cell 2,3 and 4 as specified in IE MeasDS-Config in TS 36.331 |
| LBT modelling | | | Not applied for any cell in the test |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.8.26.6A.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in non-DRX for CRS based discovery signal measurement under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | | Cell 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | | 3 | |
| Special subframe configuration | | 6 | | - | | - | | - | |
| Uplink-downlink configuration | | 1 | | - | | - | | - | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | | 20 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:18-24<br>10MHz:13-37<br>20MHz:47-52 | | 38-62 | | 38-62 | | 38-62 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 TDD<br>10MHz: R.0 TDD<br>20MHz: R.4 TDD | | R.0 FS3 | | - | | R.0 FS3 | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | R.0 FS3 | | R.0 FS3 | | R.0 FS3 | |
| OCNG Patterns | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | OP.13 FDD | | OP.14 FDD | | OP.13 FDD | |
| PBCH_RA | dB | *0* | | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | | | |
| PSS_RA | dB | | | | | | | | |
| SSS_RA | dB | | | | | | | | |
| PCFICH_RB | dB | | | | | | | | |
| PHICH_RA | dB | | | | | | | | |
| PHICH_RB | dB | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | | -104 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 | 4 | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -1.455 | -infinity | -1.455 | 4 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log ($N_{RB,c}$ /50) | -70.76+10log ($N_{RB,c}$ /50) | -67.75 | -65.41 | -67.75 | -65.41 | -67.75 |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | | ETU30 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | | 1x2 Low |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 | 0 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | N/A | ≤ TAE | N/A | ≤ TAE | N/A |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP SCH_RP and Es/Iot levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

### A.8.26.6A.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report for cell 3, with a measurement reporting delay less than 1920ms from the beginning of time period T2.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.7 E-UTRAN FDD-FS3 Intra-frequency event triggered reporting in DRX for CRS based discovery signal

### A.8.26.7.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in DRX requirements in clause 8.11.2.

The test parameters are given in Tables A.8.26.7.1-1and A.8.26.7.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are three cells: Cell 1, Cell 2, and Cell 3. Cell 1 is PCell on the FDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3. LBT model is applied on cell 3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. Immediately at beginning of T2 the transmission power of cell 3 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.7.1-1: General test parameters for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.26.7.1-3 |
| T1 | s | 5 | |
| T2 | s | 15 | During this time the UE identify a new detectable FS3 intra-frequency cell. $T_{identify_intra_FS3_DRX}$ is specified in section 8.11.2.1.1.2. |

**Table A.8.26.7.1-2: Cell specific test parameters for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | |
| LBT model | | - | | - | | A.3.17 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | | 47-52 | |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | R.1 FS3 | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | R.0 FS3 | | R.0 FS3 | |
| OCNG Patterns defined in A.3.2 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | OP.13 FDD | | OP.14 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 |
| $\hat{E}_s/I_{ot}$ | dB | 4 | 4 | 4 | -1.455 | -infinity | -1.455 |
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log ($N_{RB,c}$ /50) | -70.76+10log ($N_{RB,c}$ /50) | -67.76 | -65.42 | Specified in columns for Cell 2 | |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | N/A | N/A |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP SCH_RP and Es/Iot levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

**Table A.8.26.7.1-3: DRX-Configuration for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | Psf6 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | sf320 : 10 | |
| shortDRX | disable | |

**Table A.8.26.7.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FS3 intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

## A.8.26.7.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than (24+L)*320ms from the beginning of time period T2, where L is the number of configured discovery signal occasions during ON DURATION which are not available due to the absence of the necessary radio signals from cell3.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.26.8 E-UTRAN TDD-FS3 Intra-frequency event triggered reporting in DRX for CRS based discovery signal

## A.8.26.8.1 Test Purpose and Environment

The purpose of the test is to verify that the UE makes correct reporting of an event under operation with frame structure 3. The test will partly verify new intra-frequency FS3 cells in DRX requirements in clause 8.11.2.

The test parameters are given in Tables A.8.26.8.1-1and A.8.26.8.1-2. In the measurement control information, it is indicated to the UE performing CRS based discovery signals measurement and event-triggered reporting with Event A6 is configured.

There are three cells: Cell 1, Cell 2, and Cell 3. Cell 1 is PCell on the TDD primary component (RF Channel 1), Cell 2 is activated SCell on the secondary component (RF Channel 2) for Frame Structure 3, and Cell 3 is the neighbour cell on the secondary component (RF Channel 2) frame structure 3. LBT model is applied on cell 3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. Immediately at beginning of T2 the transmission power of cell 3 is increased, and due to usage of an offset this shall result in reporting of Event A6.

**Table A.8.26.8.1-1: General test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test |
| Active PCell | | Cell 1 | Primary cell on RF channel number 1. |
| Active SCell | | Cell 2 | Configured activated secondary cell on RF channel number 2. |
| Neighbour cell | | Cell 3 | Neighbor cell to be identified on RF channel number 2. |
| DMTC period | ms | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | ms | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | ms | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| CP length | | Normal | |
| A6-Offset | dB | -6 | |
| Time To Trigger | s | 0 | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | ON | DRX related parameters are defined in Table A.8.26.8.1-3 |
| T1 | s | 5 | |
| T2 | s | 15 | |

**Table A.8.26.8.1-2: Cell specific test parameters for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Parameter | Unit | Cell1 | | Cell2 | | Cell3 | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | | 2 | | 2 | |
| Special subframe configuration | | 6 | | - | | - | |
| Uplink-downlink configuration | | 1 | | - | | - | |
| $BW_{channel}$ | MHz | 5MHz: NRB,c = 25<br>10MHz: NRB,c = 50<br>20MHz: NRB,c = 100 | | 20 | | 20 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 38-62 | | 38-62 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | R.0 FS3 | | - | |
| PCFICH/PDCCH/PHICH parameters: DL Reference Measurement Channel | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | R.0 FS3 | | R.0 FS3 | |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.15 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.11 TDD | | OP.13 FDD | | OP.14 FDD | |
| PBCH_RA | dB | 0 | | 0 | | 0 | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PCFICH_RB | dB | | | | | | |
| PHICH_RA | dB | | | | | | |
| PHICH_RB | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -104 | | -104 | | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | 4 | 4 | -infinity | 4 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | 4 | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| SCH_RP Note 3 | dBm/ 15 kHz | -100 | -100 | -100 | -100 | -infinity | -100 |
| Io Note 3 | dBm/ Ch BW | -70.76+10log($N_{RB,c}$ /50) | -70.76+10log($N_{RB,c}$ /50) | -67.76 | -65.42 | Specified in columns for Cell 2 | |
| Propagation Condition | | ETU30 | | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | | 1x2 Low | |
| Timing offset to Cell 1 | µs | - | - | 0 | 0 | - | 3 |
| Time alignment error relative to cell 1 Note 5 | µs | - | - | ≤ TAE | ≤ TAE | N/A | N/A |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP, Es/Iot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 5: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1.

**Table A.8.26.8.1-3: DRX-Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Field | Value | Comment |
|---|---|---|
| onDurationTimer | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | |
| drx-RetransmissionTimer | psf1 | |
| longDRX-CycleStartOffset | Sf320 | |
| shortDRX | disable | |

**Table A.8.26.8.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN TDD-TDD intra-frequency event triggered reporting in DRX for CRS based discovery signal under Operation with Frame Structure 3**

| Field | Value | Comment |
|---|---|---|
| TimeAlignmentTimer | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

### A.8.26.8.2 Test Requirements

In the test, the UE shall send one Event A6 triggered measurement report, with a measurement reporting delay less than (24+L)*320ms from the beginning of time period T2, where L is the number of configured discovery signal occasions which are not available due to the absence of the necessary radio signals from cell3.

The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.9 E-UTRAN FDD-FS3 Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells

### A.8.26.9.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A4 (Neighbour becomes better than threshold) defined in TS 36.331 [2] within the requirements stated in clause 8.11.2.2.1.1.

The test parameters are given in Tables A.8.26.9.1-1 and A.8.26.9.1-2 below. In this test, there are two cells on different carrier frequencies. Cell 1 is an FDD cell and neighbouring Cell 2 is an FS3 cell.

In the measurement control information it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

**Table A.8.26.9.1-1: General test parameters for E-UTRAN FDD-FS3 inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | One FDD carrier frequency is used for active cell and one FS3 carrier frequency is used for neighbour cell. |
| Active cell | | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | | Cell 2 | Cell 2 is on RF channel number 2 |
| DMTC period | | | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Gap Pattern Id | | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | | 8 | As specified in IE MeasGapConfig in TS 36.331 |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -105 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |

| | | | | |
|---|---|---|---|---|
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | OFF |
| Time offset between cells | | | 0 ms | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | 1 | |

**Table A.8.26.9.1-2: Cell specific test parameters for E-UTRAN FDD-FS3 inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| Frame Structure | | FDD | | FS3 | |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 5 MHz:$N_{RB,c}$ = 25<br>10 MHz: $N_{RB,c}$ = 50<br>20 MHz: $N_{RB,c}$ = 100 | | 20 MHz: $N_{RB,c}$ = 100 | |
| LBT model | | - | | A.3.17 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 and A.3.1.1.6 | | 5 MHz: R.5 FDD<br>10 MHz: R.0 FDD<br>20 MHz: R.4 FDD | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.3 | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD<br>20 MHz: R.10 FDD | | R.0 FS3 | |
| OCNG Patterns defined in A.3.2 | | 5 MHz: OP.15 FDD<br>10 MHz: OP.1 FDD<br>20 MHz: OP.11 FDD | | OP.14 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -inf | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -inf | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -inf | -91 |
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -inf | 7 |
| Io | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | ETU30 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows. |
| Note 2: | The resources for uplink transmission are assigned to the UE prior to the start of time period T2. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | Es/Iot, RSRP. SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | Void |

### A.8.26.9.2 Test Requirements

The UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than (3 +L)*40 ms from the beginning of time period T2. L is the number of configured discovery signal occasions which are not available during the time for cell identification at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell,

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.8.26.10 E-UTRAN TDD-FS3 inter-frequency event triggered reporting under fading propagation conditions in synchronous cells

### A.8.26.10.1 Test Purpose and Environment

The purpose of this test is to verify that the UE correctly detects event A4 (Neighbour becomes better than threshold) defined in TS 36.331 [2] within the requirements stated in clause 8.11.2.2.2.1.

The test parameters are given in Tables A.8.26.10.1-1 and A.8.26.10.1-2 below. In this test, there are two cells on different carrier frequencies. Cell 1 is an TDD cell and neighbouring Cell 2 is an FS3 cell.

In the measurement control information it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

**Table A.8.26.10.1-1: General test parameters for E-UTRAN TDD-FS3 inter-frequency event triggered reporting in fading propagation conditions**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1, 2 | One TDD carrier frequency is used for active cell and one FS3 carrier frequency is used for neighbour cell. |
| Active cell | | | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbour cell | | | Cell 2 | Cell 2 is on RF channel number 2 |
| DMTC period | | | 40 | As specified in IE MeasDS-Config in TS 36.331 |
| dmtc-PeriodOffset | | | 10 | As specified in IE MeasDS-Config in TS 36.331 |
| Discovery signal occasion duration | | | 1 | As specified in IE MeasDS-Config in TS 36.331 |
| Gap Pattern Id | | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Gap Offset | | | 8 | As specified in IE MeasGapConfig in TS 36.331 |
| A4 | Hysteresis | dB | 0 | Hysteresis for evaluation of event A4. |
| | Threshold RSRP | dBm | -105 | Actual RSRP threshold for event A4. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin. |

| | | | | |
|---|---|---|---|---|
| | Time To Trigger | s | 0 | |
| CP length | | | Normal | |
| TimeToTrigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| DRX | | | OFF | OFF |
| Time offset between cells | | | 0 ms | Synchronous cells |
| T1 | | s | 5 | |
| T2 | | s | 1 | |

**Table A.8.26.10.1-2: Cell specific test parameters for E-UTRAN TDD-FS3 inter-frequency event triggered reporting under fading propagation conditions in synchronous cells**

| Parameter | Unit | Cell 1 | | Cell 2 | |
|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 |
| Frame Structure | | TDD | | FS3 | |
| E-UTRA RF Channel Number | | 1 | | 2 | |
| $BW_{channel}$ | MHz | 5 MHz: $N_{RB,c}$ = 25<br>10 MHz: $N_{RB,c}$ = 50<br>20 MHz:$N_{RB,c}$ = 100 | | 20 MHz:$N_{RB,c}$ = 100 | |
| Special subframe configuration | | 6 | | - | |
| Uplink-downlink configuration | | 1 | | - | |
| LBT model | | - | | A.3.17 | |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | | 1x2 Low | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 and A.3.1.1.6 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 and A.3.1.2.4 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | | R.0 FS3 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) , A.3.2.2.9 (OP.9 TDD) and A.3.2.2.7 (OP.7 TDD) | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | | OP.14 FDD | |
| PBCH_RA | dB | 0 | | 0 | |
| PBCH_RB | dB | | | | |
| PSS_RA | dB | | | | |
| SSS_RA | dB | | | | |
| PCFICH_RB | dB | | | | |
| PHICH_RA | dB | | | | |
| PHICH_RB | dB | | | | |
| PDCCH_RA | dB | | | | |
| PDCCH_RB | dB | | | | |
| PDSCH_RA | dB | | | | |
| PDSCH_RB | dB | | | | |
| OCNG_RA Note 1 | dB | | | | |
| OCNG_RB Note 1 | dB | | | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | | -98 | |
| RSRP Note 4 | dBm/15 kHz | -94 | -94 | -inf | -91 |
| $\hat{E}_s / I_{ot}$ | dB | 4 | 4 | -inf | 7 |
| SCH_RP Note 4 | dBm/15 kHz | -94 | -94 | -inf | -91 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 4 | 4 | -inf | 7 |
| Io | dBm/Ch BW | -64.76 +10log ($N_{RB,c}$ /50) | -64.76 +10log ($N_{RB,c}$ /50) | -70.22 | -62.43 |
| Propagation Condition | | ETU30 | | ETU30 | |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 2: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: Void

### A.8.26.10.2 Test Requirements

The UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than (3 +L)*40ms ms from the beginning of time period T2. L is the number of configured discovery signal occasions which are not available during the time for cell identification at the UE during measurement gaps due to the absence of the necessary radio signals from the measured cell.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.9 Measurement Performance Requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 9 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 9 for at least 90% of the reported cases.
- Cell 1 is the PCell.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

## A.9.1 RSRP

### A.9.1.1 FDD Intra frequency case

#### A.9.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.1 and 9.1.2.2 for FDD intra frequency measurements.

#### A.9.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.1.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.1.2-1: RSRP FDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -106 | -106 | -88 | -88 | -116 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -114 | |
| | Bands FDD_G Note 7 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| $\hat{E}_s / I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -100 | -105 | -82 | -87 | -113 | -117 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -112.5 | -116.5 |
| | Bands FDD_C | | | | | | -112 | -116 |
| | Bands FDD_D | | | | | | -111.5 | -115.5 |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -111 | -115 |
| | Bands FDD_G Note 7 | | | | | | -110 | -114 |
| | Bands FDD_H | | | | | | -109.5 | -113.5 |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -70.27 | -70.27 | -52.27 | -52.27 | -82.43 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -81.93 | |
| | Bands FDD_C | | | | | | -81.43 | |
| | Bands FDD_D | | | | | | -80.93 | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -80.43 | |
| | Bands FDD_G Note 7 | | | | | | -79.43 | |
| | Bands FDD_H | | | | | | -78.93 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.9.1.1.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.2.1 and 9.1.2.2. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.2.7 and 9.1.2.8.

### A.9.1.2 TDD Intra frequency case

#### A.9.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.1 and 9.1.2.2 for TDD intra frequency measurements.

#### A.9.1.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.2.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.2.2-1: RSRP TDD Intra frequency test parameters**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|

| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -106 | -106 | -88 | -88 | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.5 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -100 | -105 | -82 | -87 | -113 | -117 |
| | Bands TDD_C | | | | | | -112 | -116 |
| | Bands TDD_E | | | | | | -111 | -115 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -70.27 | -70.27 | -52.27 | -52.27 | -82.43 | |
| | Bands TDD_C | | | | | | -81.43 | |
| | Bands TDD_E | | | | | | -80.43 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.2.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.2.1 and 9.1.2.2. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.2.7 and 9.1.2.8.

# A.9.1.3 FDD—FDD Inter frequency case

## A.9.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3.1 and 9.1.3.2 for FDD—FDD inter frequency measurements. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.2.7 and 9.1.2.8.

## A.9.1.3.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.3.2-1 In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.1.3.2-1: RSRP FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RANote1 | | | | | | |
| OCNG_RBNote | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -88.65 | -88.65 | ( $N_{oc}$ for Channel 2 +8dB) | -117 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | -116.5 |
| | Bands FDD_C | | | | | -116 |
| | Bands FDD_D | | | | | -115.5 |
| | Bands FDD_E, FDD_F Note 5 | | | | | -115 |
| | Bands FDD_G Note 7 | | | | | -114 |
| | Bands FDD_H | | | | | -113.5 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -121 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | -120.5 |
| | Bands FDD_C | | | | | -120 |
| | Bands FDD_D | | | | | -119.5 |
| | Bands FDD_E, FDD_F Note 5 | | | | | -119 |
| | Bands FDD_G Note 7 | | | | | -118 |
| | Bands FDD_H | | | | | -117.5 |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 | -87.76 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | -87.26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_C | | | | +19.75dB) | -86.76 |
| | Bands FDD_D | | | | | -86.26 |
| | Bands FDD_E, FDD_F Note 5 | | | | | -85.76 |
| | Bands FDD_G Note 7 | | | | | -84.76 |
| | Bands FDD_H | | | | | -84.26 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.3.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3.1 and 9.1.3.2. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.3.3 and 9.1.3.4.

## A.9.1.4 TDD—TDD Inter frequency case

### A.9.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3.1 and 9.1.3.2 for TDD—TDD inter frequency measurements.

### A.9.1.4.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.4.2-1 for TDD configuration 1 and in Table A.9.1.4.2-2 for TDD configuration 0. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.1.4.2-1: RSRP TDD—TDD Inter frequency test parameters for TDD configuration 1**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Special subframe configuration Note1 | | 6 | | 6 | |
| Uplink-downlink configuration Note1 | | 1 | | 1 | |
| Gap Pattern Id | | 0 | - | 0 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note2] | | | | | | |
| OCNG_RB[Note2] | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -88.65 | -88.65 | ($N_{oc}$ for Channel 2 +8dB) | -117 |
| | Bands TDD_C | | | | | -116 |
| | Bands TDD_E | | | | | -115 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -121 |
| | Bands TDD_C | | | | | -120 |
| | Bands TDD_E | | | | | -119 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 +19.75dB) | -87.76 |
| | Bands TDD_C | | | | | -86.76 |
| | Bands TDD_E | | | | | -85.76 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.4.2-2: RSRP TDD—TDD Inter frequency test parameters for *TDD configuration 0***

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | | 6 | |
| Uplink-downlink configuration[Note1] | | 0 | | 0 | |
| Gap Pattern Id | | 0 | - | 0 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.5 TDD | - | R.5 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note2] | | | | | | |
| OCNG_RB[Note2] | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -88.65 | -88.65 | ($N_{oc}$ for Channel 2 +8dB) | -117 |
| | Bands TDD_C | | | | | -116 |
| | Bands TDD_E | | | | | -115 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -121 |
| | Bands TDD_C | | | | | -120 |
| | Bands TDD_E | | | | | -119 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 +19.75dB) | -87.76 |
| | Bands TDD_C | | | | | -86.76 |
| | Bands TDD_E | | | | | -85.76 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.4.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3.1 and 9.1.3.2. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.3.3 and 9.1.3.4.

## A.9.1.5 FDD—TDD Inter frequency case

### A.9.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3.1 and 9.1.3.2 for FDD—TDD inter frequency measurements.

### A.9.1.5.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.5.2-1 and Table A.9.1.5.2-2. In all test cases, Cell 1 is the serving cell and Cell 2 the target cell. Cell 1 is FDD cell and Cell 2 is TDD cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.1.5.2-1: RSRP FDD—TDD Inter frequency test parameters (FDD Cell1)**

| Parameter | Unit | Test 1 | Test 2 |
|---|---|---|---|
| | | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Gap Pattern Id | | 0 | 0 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | | R.0 FDD | |
| PDSCH allocation | $n_{PRB}$ | 13—36 | | 13—36 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | | OP.1 FDD | |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RANote1 | | | | | |
| OCNG_RBNote | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -88.65 | | -104 | |
| $\hat{E}_s / I_{ot}$ | dB | 10 | | 13 | |
| RSRPNote3 | dBm/15 kHz | -78.65 | | -91 | |
| IoNote3 | dBm/9 MHz | -50.45 | | -63.01 | |
| $\hat{E}_s / N_{oc}$ | dB | 10 | | 13 | |
| Propagation condition | - | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

**Table A.9.1.5.2-2: RSRP FDD—TDD Inter frequency test parameters (TDD cell2)**

| Parameter | Unit | Test 1 | Test 2 |
|---|---|---|---|
| | | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Special subframe configurationNote1 | | 6 | 6 |
| Uplink-downlink configurationNote1 | | 1 | 1 |
| Gap Pattern Id | | - | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | - | - |
| PDSCH allocation | $n_{PRB}$ | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |

| | | | |
|---|---|---|---|
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA Note2 | | | |
| OCNG_RB Note2 | | | |
| $N_{oc}$ Note3 | dBm/15 kHz | -88.65 | -112 |
| $\hat{E}_s / I_{ot}$ | dB | 10 | -4 |
| RSRP Note4 | dBm/15 kHz | -78.65 | -116 |
| Io Note4 | dBm/9 MHz | -50.45 | -82.76 |
| $\hat{E}_s / N_{oc}$ | dB | 10 | -4 |
| Propagation condition | - | AWGN | AWGN |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.1.5.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3.1 and 9.1.3.2. The RSRP measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.3.3 and 9.1.3.4.

## A.9.1.6 FDD RSRP for E-UTRAN Carrier Aggregation

### A.9.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2. The test will also verify the primary and secondary component carrier relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.6.2 Test parameters

In this set of cases cell1 is PCell on the primary component carrier, cell2 is SCell on the secondary component carrier and activated, and cell3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.6.2-1.

**Table A.9.1.6.2-1: RSRP FDD carrier aggregation test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Timing offset to cell1 | μs | - | 0 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| Time alignment error between cell 2 and cell 1 | | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RANote1<br>OCNG_RBNote | | dB | 0 | 0 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRPNote3 | Bands FDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| IoNote3 | Bands FDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -87.26 | | |
| | Bands FDD_C | | -86.76 | | |
| | Bands FDD_D | | -86.26 | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 | | |
| | Bands FDD_G | | -84.76 | | |
| | Bands FDD_H | | -84.26 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | AWGN | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 6: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 7: | This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 9: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.6.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.7 TDD RSRP for E-UTRAN Carrier Aggregation

The test case in this clause are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the absolute RSRP accuracy on PCell defined in clause 9.1.11.1, the absolute RSRP accuracy on Scell defined in clause 9.1.11.2, the relative RSRP accuracy between SCell and Cell 3 defined in clause 9.1.11.2, and the relative RSRP accuracy between PCell and SCell defined in clause 9.1.11.3.

### A.9.1.7.2 Test parameters

In this set of test cases there are three cells on two carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, and Cell 3 is neighbour cell which is also on channel 2. The parameters for the test are listed in Table A.9.1.7.2-1.

**Table A.9.1.7.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink/downlink configuration[Note1] | | 1 | | |
| Timing offset to Cell 1 | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified | - |

| | | | | | |
|---|---|---|---|---|---|
| | | | | in 3GPP TS 36.104 [30] clause 6.5.3.1 | |
| Measurement bandwidth | | $n_{PRB}$ | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.5 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands TDD_C | | -86.76 | | |
| | Bands TDD_E | | -85.76 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.7.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3

## A.9.1.8 FDD RSRP under Time-Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.9.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.3 and 9.1.2.4 for FDD intra-frequency RSRP measurements under time-domain measurement resource restriction with non-MBSFN ABS configured in the aggressor cell.

### A.9.1.8.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.8.2-1 and A.9.1.8.2-2.

In the tests there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 2. Cell 2 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 2 are measured for RSRP relative accuracy. Non-MBSFN ABS pattern is configured for Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.1.8.2-1: General test parameters for E-UTRAN FDD RSRP intra frequency test parameters under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 2 |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})mod6 != 0$ | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met |
| ABS pattern | | '10000000100000001000 00001000000010000000' | Non-MBSFN ABS. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are cofigured in the ABS subframes in Cell 1. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '10000000100000001000 00001000000010000000' | Configured for Cell 2 measurements by measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '01000000010000000100 00001000000001000000' | Configured for measurements on Cell 1. |

**Table A.9.1.8.2-2: Cell-specific test parameters for E-UTRAN FDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and A.3.2.1.6 (OP.6 FDD) | | | OP.5 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD |
| PBCH_RA | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PBCH_RB | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A Note 10 | dBm/15 kHz | -106 | | -88 | | -116 | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -114 | |
| | Bands FDD_G Note 9 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -4 | 5 | -4 |
| CRS $(\hat{E}_s / I_{ot})_{meas}$ Note 5 | | dB | 2.88 | -2 | 3.54 | -4 | 3.54 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -0.46 | -7.54 | -0.46 | -7.54 |
| RSRP Note3,4,5 | Bands FDD_A Note 10 | dBm/15 kHz | -101 | -108 | -83 | -92 | -111 | -120 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -110.5 | -119.5 |
| | Bands FDD_C | | | | | | -110 | -119 |
| | Bands FDD_D | | | | | | -109.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -109 | -118 |
| | Bands FDD_G Note 9 | | | | | | -108 | -117 |
| | Bands FDD_H | | | | | | -107.5 | -116.5 |
| $(\mathrm{Io})_{meas}$ Note 3 | Bands FDD_A Note 10 | dBm/9 MHz | -71.41 | -74.88 | -53.63 | -57.37 | -81.63 | -85.37 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -81.13 | -84.87 |
| | Bands FDD_C | | | | | | -80.63 | -84.37 |
| | Bands FDD_D | | | | | | -80.13 | -83.87 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -79.63 | -83.37 |
| | Bands FDD_G Note 9 | | | | | | -78.63 | -82.37 |
| | Bands FDD_H | | | | | | -78.13 | -81.87 |
| Propagation condition | | | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes of the respective cell.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: Except Band 29.
Note 10: Except Band 32, Band 75, Band 76.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.8.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.3 and 9.1.2.4, respectively.

## A.9.1.9 TDD RSRP under Time-Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.9.1.9.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.3 and 9.1.2.4 for TDD intra-frequency RSRP measurements under time-domain measurement resource restriction with non-MBSFN ABS configured in the aggressor cell.

### A.9.1.9.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.9.2-1 and A.9.1.9.2-2.

In the tests there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 2. Cell 2 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 2 are measured for RSRP relative accuracy. Non-MBSFN ABS pattern is configured for Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.1.9.2-1: General test parameters for E-UTRAN TDD RSRP intra frequency test parameters under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | Also the aggressor cell. |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| Special subframe configuration | | 6 | For Cell 1 and Cell 2. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})\bmod 6 \neq 0$ | Cell PCIs for Cell 1 and Cell 2 are randomly selected so that the condition is met |

| | | | |
|---|---|---|---|
| ABS pattern | | '00000000010000000001' | Non-MBSFN ABS. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are cofigured in the ABS subframes in Cell 1. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00000000010000000001' | Configured for Cell 2 measurements by measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000001000000000' | Configured for Cell 1 measurements. |

**Table A.9.1.9.2-2: Cell-specific test parameters for E-UTRAN TDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note 2 | Bands TDD_A | dBm/15 kHz | -106 | | -88 | | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -4 | 5 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | 2.88 | -2 | 3.54 | -4 | 5 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -0.46 | -7.54 | -0.46 | -7.54 |
| RSRP Note3,4,5 | Bands TDD_A | dBm/15 kHz | -101 | -108 | -83 | -92 | -111 | -120 |
| | Bands TDD_C | | | | | | -110 | -119 |
| | Bands TDD_E | | | | | | -109 | -118 |
| $(\mathrm{Io})_{meas}$ Note 3 | Bands TDD_A | dBm/9 MHz | -71.41 | -74.88 | -53.63 | -57.37 | -81.6 | -85.4 |
| | Bands TDD_C | | | | | | -80.6 | -84.4 |
| | Bands TDD_E | | | | | | -79.6 | -83.4 |
| Propagation condition | | | AWGN | | AWGN | | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes. |
| Note 3: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes. |
| Note 4: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | Applies to restricted measurement subframes of the respective cell. |
| Note 6: | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. |
| Note 7: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.9.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.3 and 9.1.2.4, respectively.

## A.9.1.10 FDD RSRP under Time-Domain Measurement Resource Restriction with MBSFN ABS

### A.9.1.10.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.3 and 9.1.2.4 for FDD intra-frequency RSRP measurements under time-domain measurement resource restriction with MBSFN ABS configured in the aggressor cell.

### A.9.1.10.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.10.2-1 and A.9.1.10.2-2.

In the tests there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 2. Cell 2 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 2 are measured for RSRP relative accuracy. MBSFN ABS pattern is configured in Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.1.10.2-1: General test parameters for E-UTRAN FDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 2 |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | MBSFN ABS | As defined in Table A.3.4.2.1-1 |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})mod6 =0$, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met |
| ABS pattern | | '01000000100000001000000000010000001000000' | MBSFN ABS pattern. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. All ABS subframes are MBSFN subframes. |

| | | | |
|---|---|---|---|
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '01000000100000001000 00000010000001000000' | Configured for Cell 2 measurements by measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '00010000000100000001 00000001000000010000' | Configured for measurements on Cell 1. |

**Table A.9.1.10.2-2: Cell-specific test parameters for E-UTRAN FDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.8 (OP.8 FDD) and A.3.2.1.6 (OP.6 FDD) | | | OP.8 FDD | OP.6 FDD | OP.8 FDD | OP.6 FDD | OP.8 FDD | OP.6 FDD |
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note 2 | Bands FDD_A Note 11 | dBm/15 kHz | -106 | | -88 | | -116 | |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -114 | |
| | Bands FDD_G Note 10 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -4 | 5 | -4 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ Note 5, 7 in the 1st OFDM symbol | | dB | 2.88 | -8.19 | 3.54 | -10.19 | 3.54 | -10.19 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ Note 5 in OFDM symbols 4,7,11 | | dB | 2.88 | -2 | 3.54 | -4 | 3.54 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -0.46 | -7.54 | -0.46 | -7.54 |
| RSRP Note 3,4 | Bands FDD_A Note 11 | dBm/15 kHz | -101 | -108 | -83 | -92 | -111 | -120 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -110.5 | -119.5 |
| | Bands FDD_C | | | | | | -110 | -119 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_D | | | | | | -109.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -109 | -118 |
| | Bands FDD_G Note 10 | | | | | | -108 | -117 |
| | Bands FDD_H | | | | | | -107.5 | -116.5 |
| $(\mathrm{Io})_{meas}$ Note 3 in the 1st OFDM symbol | Bands FDD_A Note 11 | dBm/9 MHz | -71.41 | -74.88 | -53.63 | -57.37 | -81.63 | -85.37 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -81.13 | -84.87 |
| | Bands FDD_C | | | | | | -80.63 | -84.37 |
| | Bands FDD_D | | | | | | -80.13 | -83.87 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -79.63 | -83.37 |
| | Bands FDD_G Note 10 | | | | | | -78.63 | -82.37 |
| | Bands FDD_H | | | | | | -78.13 | -81.87 |
| $(\mathrm{Io})_{meas}$ Note 3 in OFDM symbols other than the 1st one | Bands FDD_A Note 11 | dBm/9 MHz | -71.41 | -76.09 | -53.63 | -58.76 | -81.63 | -86.76 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -81.13 | -86.26 |
| | Bands FDD_C | | | | | | -80.63 | -85.76 |
| | Bands FDD_D | | | | | | -80.13 | -85.26 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -79.63 | -84.76 |
| | Bands FDD_G Note 10 | | | | | | -78.63 | -83.76 |
| | Bands FDD_H | | | | | | -78.13 | -83. 26 |
| Propagation condition | | | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Applies to restricted measurement subframes of the respective cell.

Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.1-1.

Note 7: In the 1st OFDM symbol, Cell 2 is not expected to meet the Es/Iot side condition in 9.1.2.3 and 9.1.2.4.

Note 8: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 9: E-UTRA operating band groups are as defined in Section 3.5.

Note 10: Except Band 29.

Note 11: Except Band 32, Band 75, Band 76.

Note 12: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.10.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.3 and 9.1.2.4, respectively.

## A.9.1.11 TDD RSRP under Time-Domain Measurement Resource Restriction with MBSFN ABS

### A.9.1.11.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.3 and 9.1.2.4 for TDD intra-frequency RSRP measurements under time-domain measurement resource restriction with MBSFN ABS configured in the aggressor cell.

### A.9.1.11.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.11.2-1 and A.9.1.11.2-2.

In the tests there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 2. Cell 2 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 2 are measured for RSRP relative accuracy. MBSFN ABS pattern is configured in Cell 1 during the test. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.1.11.2-1: General test parameters for E-UTRAN TDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 2 |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | MBSFN ABS | As defined in Table A.3.4.2.1-1 |
| Special subframe configuration | | 6 | For Cell 1 and Cell 2. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})mod6 =0$, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met |
| ABS pattern | | '00001000000000100000' | MBSFN ABS pattern. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. All ABS subframes are MBSFN subframes. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00001000000000100000' | Configured for Cell 2 measurements by measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000001000000000' | Configured for measurements on Cell 1. |

**Table A.9.1.11.2-2: Cell-specific test parameters for E-UTRAN TDD RSRP intra-frequency test parameters under time-domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | R.6 TDD | | R.6 TDD | |

| OCNG Patterns defined in A.3.2.2.5 (OP.5 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.5 TDD | OP.2 TDD | OP.5 TDD | OP.2 TDD | OP.5 TDD | OP.2 TDD |
|---|---|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note 2 | Bands TDD_A | dBm/15 kHz | -106 | | -88 | | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -4 | 5 | -4 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ note 5, note 7 in the 1st OFDM symbol | | dB | 2.88 | -8.19 | 3.54 | -10.19 | 3.54 | -10.19 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ note 5 in OFDM symbols 4,7,11 | | dB | 2.88 | -2 | 3.54 | -4 | 3.54 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -0.46 | -7.54 | -0.46 | -7.54 |
| RSRP Note 3,4 | Bands TDD_A | dBm/15 kHz | -101 | -108 | -83 | -92 | -111 | -120 |
| | Bands TDD_C | | | | | | -110 | -119 |
| | Bands TDD_E | | | | | | -109 | -118 |
| $(\mathrm{Io})_{meas}$ Note 3 in the 1st OFDM symbol | Bands TDD_A | dBm/9 MHz | -71.41 | -74.88 | -53.63 | -57.37 | -81.63 | -85.37 |
| | Bands TDD_C | | | | | | -80.63 | -84.37 |
| | Bands TDD_E | | | | | | -79.63 | -83.37 |
| $(\mathrm{Io})_{meas}$ Note 3 in OFDM symbols other than the 1st one | Bands TDD_A | dBm/9 MHz | -71.41 | -76.09 | -53.63 | -58.76 | -81.63 | -86.76 |
| | Bands TDD_C | | | | | | -80.63 | -85.76 |
| | Bands TDD_E | | | | | | -79.63 | -84.76 |
| Propagation condition | | | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port

Note 5: Applies to restricted measurement subframes of the respective cell.

Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.1-1.

Note 7: In the 1st OFDM symbol, Cell 2 is not expected to meet the Es/Iot side condition in 9.1.2.3 and 9.1.2.4.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.11.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.3 and 9.1.2.4, respectively.

## A.9.1.12 FDD RSRP for E-UTRAN Carrier Aggregation for 20MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.12.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.6.1.

### A.9.1.12.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.12.2-1 will replace the values of corresponding parameters in Tables A.9.1.6.2-1.

**Table A.9.1.12.2-1: RSRP FDD carrier aggregation test parameters**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 20 | 20 | 20 |
| Measurement bandwidth | | $n_{PRB}$ | 47—52 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.4 FDD | R.4 FDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 38—61 | 38—61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.10 FDD | | |
| OCNG Patterns defined in A.3.2.1.11 (OP.11 FDD) and A.3.2.1.12 (OP.12 FDD) | | | OP.11 FDD | OP.11 FDD | OP.12 FDD |
| Io Note2 | Bands FDD_A Note 5 | dBm/18 MHz | -84.75 | (Io for Channel 1 +5.33dB) | |
| | Bands FDD_B1 Note 5, FDD_B2 Note 5, Note 6 | | -84.25 | | |
| | Bands FDD_C Note 5 | | -83.75 | | |
| | Bands FDD_D Note 5 | | -83.25 | | |
| | Bands FDD_E Note 5 | | -82.75 | | |
| | Bands FDD_G Note 5 | | -81.75 | | |
| | Bands FDD_H Note 5 | | -81.25 | | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: See Table A.9.1.6.2-1 for the other parameters.
Note 4: E-UTRA operating band groups are as defined in Section 3.5.
Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 20 MHz channel bandwidth.
Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.12.3 Test Requirements

The test requirements defined in section A.9.1.6.3 shall apply to this test case.

## A.9.1.13 TDD RSRP for E-UTRAN Carrier Aggregation for 20MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.13.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.7.1.

### A.9.1.13.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.13.2-1 will replace the values of corresponding parameters in Tables A.9.1.7.2-1.

**Table A.9.1.13.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 20 | | |
| Measurement bandwidth | | $n_{PRB}$ | 47—52 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.3 TDD | R.3 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 38—61 | 38—61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.10 TDD | | |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and A.3.2.2.8 (OP.8 TDD) | | | OP.7 TDD | OP.7 TDD | OP.8 TDD |
| $Io^{Note2}$ | Bands TDD_A Note 5 | dBm/18 MHz | -84.75 | (Io for Channel 1 +5.33dB) | |
| | Bands TDD_C Note 5 | | -83.75 | | |
| | Bands TDD_E Note 5 | | -82.75 | | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: See Table A.9.1.7.2-1 for the other parameters.
Note 4: E-UTRA operating band groups are as defined in Section 3.5.
Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 20 MHz channel bandwidth.

### A.9.1.13.3 Test Requirements

The test requirements defined in section A.9.1.7.3 shall apply to this test case.

## A.9.1.14 FDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.1.14.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.5 and 9.1.2.6 for FDD intra-frequency RSRP measurements under time-domain measurement resource restriction with CRS Assistance Information and non-MBSFN ABS configured in the aggressor cells.

### A.9.1.14.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.14.2-1 and A.9.1.14.2-2.

In the tests there are three synchronous cells, Cell 1, Cell2 and Cell 3, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 3. Cell 2 is the neighbour aggressor cell without CRS colliding to Cell 3. Cell 3 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 3 are measured for RSRP relative accuracy. Non-MBSFN ABS pattern is configured for Cell 1 and Cell 2 during the test.

The UE is configured by higher layers with a time domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells, namely Cell 3 measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement pattern and the CRS assistance information shall be provided via RRC to the UE before the measurements start.

Note: It's up to eNB's implementation whether the time domain measurement resource restriction pattern for PCell measurements is configured or not.

**Table A.9.1.14.2-1: General test parameters for FDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Serving cell (PCell) | | | Cell 1 | The aggressor cell to Cell 3 |
| Neighbour cell | | | Cell 2 | The aggressor cell to Cell 3 |
| Neighbour cell | | | Cell 3 | Cell to be measured |
| PCell ABS configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | | Normal | For three cells in the test |
| DRX | | | | OFF |
| Cell 2 time offset with respect to Cell 1 | | | 0μs | Synchronous cells |
| Cell 3 time offset with respect to Cell 1 | | | -2.5 μs | Synchronous cells |
| Physical cell ID PCI | | | Colliding CRS: ($PCI_{cell1}$ – $PCI_{cell3}$)mod6=0, $PCI_{cell1}$ not equal to $PCI_{cell3}$<br>Non-colliding CRS: ($PCI_{cell2}$ – $PCI_{cell3}$)mod6 !=0 | Cell PCIs for three cells are selected randomly so that all conditions are met |
| ABS pattern | | | '10000000100000001000000010000000010000000' | Non-MBSFN ABS. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are configured in the ABS subframes in Cell 1. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | | '10000000100000001000000010000000010000000' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5.<br>Configured before the measurements start. The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | | '01000000010000000100000000100000001000000' | Configured for measurements on Cell 1. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 only in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *one Frame*='000000'. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.9.1.14.2-2: Cell-specific test parameters for FDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Test 1 | | | Test 2 | | | Test 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | | 22—27 | | | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - | - | R.0 FDD | - | - | R.0 FDD | - | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | - | 13—36 | - | - | 13—36 | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | | R.6 FDD | | | R.6 FDD | | |

| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and A.3.2.1.6 (OP.6 FDD) | | | OP.5 FDD | OP.6 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD | OP.6 FDD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | Note 6 | 0 | Note 6 | Note 6 | 0 | Note 6 | Note 6 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A Note 10 | dBm/15 kHz | -106 | | | -88 | | | -116 | | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | -115.5 | | |
| | Bands FDD_C | | | | | | | | -115 | | |
| | Bands FDD_D | | | | | | | | -114.5 | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -114 | | |
| | Bands FDD_G Note 9 | | | | | | | | -113 | | |
| | Bands FDD_H | | | | | | | | -112.5 | | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 4 | 2 | -1.5 | 4 | 2 | -4 | 4 | 2 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | -1.18 | -0.32 | -6.96 | -0.75 | 0.54 | -9.46 | -0.75 | 0.54 | -9.46 |
| RSRP Note3,4,5 | Bands FDD_A Note 10 | dBm/15 kHz | -102 | -104 | -107.5 | -84 | -86 | -92 | -112 | -114 | -120 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | -111.5 | -113.5 | 119.5 |
| | Bands FDD_C | | | | | | | | -111 | -113 | -119 |
| | Bands FDD_D | | | | | | | | -110.5 | -112.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -110 | -112 | -118 |
| | Bands FDD_G Note 9 | | | | | | | | -109 | -111 | -117 |
| | Bands FDD_H | | | | | | | | -108.5 | -110.5 | -116.5 |
| $(\mathrm{Io})_{meas}$ Note 3,5 | Bands FDD_A Note 10 | dBm/9 MHz | -70.58 | -74.43 | | -52.82 | -57.04 | | -80.82 | -85.04 | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | -80.32 | -84.54 | |
| | Bands FDD_C | | | | | | | | -79.82 | -84.04 | |
| | Bands FDD_D | | | | | | | | -79.32 | -83.54 | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -78.82 | -83.04 | |
| | Bands FDD_G Note 9 | | | | | | | | -77.82 | -82.04 | |
| | Bands FDD_H | | | | | | | | -77.32 | -81.54 | |
| Propagation condition | | | AWGN | | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes for only Cell 2 and Cell 3. For Cell 1, the corresponding value is derived from the normal subframes other than the subframes indicated in the time domain measurement resource restriction pattern for intra-frequency measurements.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: Except Band 29.
Note 10: Except Band 32, Band 75, Band 76.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.14.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.5 and 9.1.2.6, respectively.

## A.9.1.15 TDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.1.15.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.5 and 9.1.2.6 for TDD intra-frequency RSRP measurements under time-domain measurement resource restriction with CRS Assistance Information and non-MBSFN ABS configured in the aggressor cells.

### A.9.1.15.2 Test parameters

In this set of test cases all cells are on the same carrier frequency as PCell. Both absolute and relative accuracy of RSRP intra-frequency measurements are tested, with test parameters specified in Tables A.9.1.15.2-1 and A.9.1.15.2-2.

In the tests there are three synchronous cells, Cell 1, Cell2 and Cell 3, on the same RF channel. In all test cases, Cell 1 is the serving cell (PCell) and also the aggressor cell to Cell 3. Cell 2 is the neighbour aggressor cell without CRS colliding to Cell 3. Cell 3 is the cell to be measured for RSRP absolute accuracy, whilst both Cell 1 and Cell 3 are measured for RSRP relative accuracy. Non-MBSFN ABS pattern is configured for Cell 1 and Cell 2 during the test.

The UE is configured by higher layers with a time domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells, namely Cell 3 measurements. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement pattern and the CRS assistance information shall be provided via RRC to the UE before the measurements start.

Note: It's up to eNB's implementation whether the time domain measurement resource restriction pattern for PCell measurements is configured or not.

**Table A.9.1.15.2-1: General test parameters for TDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 3 |
| Neighbour cell | | Cell 2 | The aggressor cell to Cell 3 |
| Neighbour cell | | Cell 3 | Cell to be measured |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | Normal | For three cells in the test |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells |

| | | | | |
|---|---|---|---|---|
| Uplink-downlink configuration | | | 1 | As specified in table 4.2-2 in TS 36.211. The same configuration in both cells |
| DRX | | | | OFF |
| Cell 2 time offset with respect to Cell 1 | | | 0μs | Synchronous cells |
| Cell 3 time offset with respect to Cell 1 | | | -2.5 μs | Synchronous cells |
| Physical cell ID PCI | | | Colliding CRS: ($PCI_{cell1}$ – $PCI_{cell3}$)mod6=0, $PCI_{cell1}$ not equal to $PCI_{cell3}$<br>Non-colliding CRS: ($PCI_{cell2}$ – $PCI_{cell3}$)mod6 !=0 | Cell PCIs for three cells are selected randomly so that all conditions are met |
| ABS pattern | | | ‘00000000010000000001’ | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Provided to the UE for Cell 1 and Cell 2 before the measurements start. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | | ‘00000000010000000001’ | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5.<br>Configured before the measurements start. The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | | ‘10000000001000000000’ | Configured for Cell 1 measurements. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 only in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *one Frame*=’000000’. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = ‘000000’ | |

**Table A.9.1.15.2-2: Cell-specific test parameters for TDD RSRP under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS**

| Parameter | Unit | Test 1 | | | Test 2 | | | Test 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | | 22—27 | | | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - | - | R.0 TDD | - | - | R.0 TDD | - | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | - | 13—36 | - | - | 13—36 | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | | R.6 TDD | | | R.6 TDD | | |
| OCNG Patterns defined in A.3.2.2 | | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | Note 6 | | 0 | Note 6 | | 0 | Note 6 | | 0 |
| PBCH_RB | | | | | | | | | | |
| PSS_RA | | | | | | | | | | |
| SSS_RA | | | | | | | | | | |
| PCFICH_RB | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PHICH_RA | | | | | | | | | | | |
| PHICH_RB | | | | | | | | | | | |
| PDCCH_RA | | | | | | | | | | | |
| PDCCH_RB | | | | | | | | | | | |
| PDSCH_RA | | | | | | | | | | | |
| PDSCH_RB | | | | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | | | | |
| $N_{oc}$ Note2 | Bands TDD_A | dBm/15 kHz | -106 | | | -88 | | | -116 | | |
| | Bands TDD_C | | | | | | | | -115 | | |
| | Bands TDD_E | | | | | | | | -114 | | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 4 | 2 | -1.5 | 4 | 2 | -4 | 4 | 2 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | -1.18 | -0.32 | -6.96 | -0.75 | 0.54 | -9.46 | -0.75 | 0.54 | -9.46 |
| RSRP Note3,4,5 | Bands TDD_A | dBm/15 kHz | -102 | -104 | -107.5 | -84 | -86 | -92 | -112 | -114 | -120 |
| | Bands TDD_C | | | | | | | | -111 | -113 | -119 |
| | Bands TDD_E | | | | | | | | -110 | -112 | -118 |
| $(\mathrm{Io})_{meas}$ Note 3, 5 | Bands TDD_A | dBm/9 MHz | -70.58 | -74.43 | | -52.82 | -57.04 | | -80.82 | -85.04 | |
| | Bands TDD_C | | | | | | | | -79.82 | -84.04 | |
| | Bands TDD_E | | | | | | | | -78.82 | -83.04 | |
| Propagation condition | | | AWGN | | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Applies to restricted measurement subframes for only Cell 2 and Cell 3. For Cell 1, the corresponding value is derived from the normal subframes other than the subframes indicated in the time domain measurement resource restriction pattern for intra-frequency measurements.

Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.

Note 7: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.15.3 Test Requirements

The absolute RSRP measurement accuracy and relative RSRP measurement accuracy shall fulfill the requirements in Sections 9.1.2.5 and 9.1.2.6, respectively.

## A.9.1.16 FDD Intra frequency case for 5MHz Bandwidth

### A.9.1.16.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2.1 and 9.1.2.2 for FDD intra frequency measurements.

### A.9.1.16.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.16.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.16.2-1: RSRP FDD Intra frequency test parameters for 5MHz Bandwidth**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1-1 | | R.5 FDD | - | R.5 FDD | - | R.5 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 7—17 | - | 7-17 | - | 7-17 | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in **A.3.1.2.1-1** | | | R.11 FDD | | R.11 FDD | | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD_N | dBm/15 kHz | -103 | | -83 | | -109.5 | |
| $\hat{E}_s / I_{ot}$ | | dB | 2.46 | -5.97 | 2.46 | -5.97 | 0.46 | -5.76 |
| RSRP[Note3] | Bands FDD_N | dBm/15 kHz | -97 | -102 | -77 | -82 | -106.5 | -110.5 |
| Io[Note3] | Bands FDD_N | dBm/4.5 MHz | -70.28 | | -50.28 | | -78.94 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.1.16.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.2.1 and 9.1.2.2.

## A.9.1.17 FDD—FDD Inter frequency case for 5MHz Bandwidth

### A.9.1.17.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3.1 and 9.1.3.2 for FDD—FDD inter frequency measurements.

### A.9.1.17.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.17.2-1 In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.1.17.2-1: RSRP FDD—FDD Inter frequency test parameters for 5MHz Bandwidth**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 5 | 5 | 5 | 5 |
| Gap Pattern Id | | | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.5 FDD | - | R.5 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 7—17 | - | 7-17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.11 FDD | | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | Cell 2: Bands FDD_N | dBm/15 kHz | -85.65 | -85.65 | -102.5 | -110.5 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP Note3 | Cell 2: Bands FDD_N | dBm/15 kHz | -75.65 | -75.65 | -89.5 | -114.5 |
| Io Note3 | Cell 2: Bands FDD_N | dBm/4.5 MHz | -50.46 | -50.46 | -64.52 | -84.27 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: This test is only applicable for testing inter-frequency requirements for Bands FDD_N. Cell 2 is on the Band under test, and Cell 1 is on another band supported by the UE.

**Table A.9.1.17.2-1: Void**

## A.9.1.17.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3.1 and 9.1.3.2.

# A.9.1.18 FDD RSRP for E-UTRAN Carrier Aggregation for 10MHz + 5MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

## A.9.1.18.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.6.1.

## A.9.1.18.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.18.2-1 will replace the values of corresponding parameters in Tables A.9.1.6.2-1.

**Table A.9.1.18.2-1: RSRP FDD carrier aggregation test parameters**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 10 | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | 10-15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.5 FDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | 7-17 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1 (FDD) | | | OP.1 FDD | OP.15 FDD | OP.16 FDD |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 4 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| | Bands FDD_N | | N/A | | |
| RSRP Note2 | Bands FDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 4 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| | Bands FDD_N | | N/A | | |
| Io Note2 | Bands FDD_A | dBm/9 MHz | -87.76 | N/A | |
| | Bands FDD_B1, FDD_B2 Note 4 | | -87.26 | | |
| | Bands FDD_C | | -86.76 | | |
| | Bands FDD_D | | -86.26 | | |
| | Bands FDD_E, FDD_F | | -85.76 | | |
| | Bands FDD_G | | -84.76 | | |
| | Bands FDD_H | | -84.26 | | |
| | Bands FDD_A | dBm/4.5 MHz | N/A | (Io for Channel 1 +2.32dB) | |
| | Bands FDD_B1, FDD_B2 Note 4 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F | | | | |
| | Bands FDD_G | | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_H | | | |
| | Bands FDD_N | | | -80.94 |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | |
| Note 2: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | |
| Note 3: See Table A.9.1.6.2-1 for the other parameters. | | | | |
| Note 4: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. | | | | |

### A.9.1.18.3 Test Requirements

The test requirements defined in section A.9.1.6.3 shall apply to this test case.

## A.9.1.19 TDD RSRP for E-UTRAN Carrier Aggregation for 10MHz + 5MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.19.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.7.1.

### A.9.1.19.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.19.2-1 will replace the values of corresponding parameters in Tables A.9.1.7.2-1.

**Table A.9.1.19.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 10 | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | 10-15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | R.4 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | 7-17 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.11 TDD | |
| OCNG Patterns defined in A.3.2.2 (TDD) | | | OP.1 TDD | OP.9 TDD | OP.10 TDD |
| Io Note2 | Bands TDD_A | dBm/9 MHz | -87.76 | N/A | |
| | Bands TDD_C | | -86.76 | | |
| | Bands TDD_E | | -85.76 | | |
| | Bands TDD_A | dBm/4.5MHz | N/A | (Io for Channel 1 +2.32dB) | |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |
| Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| Note 3: See Table A.9.1.7.2-1 for the other parameters. | | | | | |

### A.9.1.19.3 Test Requirements

The test requirements defined in section A.9.1.7.3 shall apply to this test case.

## A.9.1.20 FDD RSRP for E-UTRAN Carrier Aggregation for 5MHz + 5MHz bandwidth

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

## A.9.1.20.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.6.1.

## A.9.1.20.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.20.2-1 will replace the values of corresponding parameters in Tables A.9.1.6.2-1.

**Table A.9.1.20.2-1: RSRP FDD carrier aggregation test parameters**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 5 | 5 | 5 |
| Measurement bandwidth | | $n_{PRB}$ | 10-15 | 10-15 | 10-15 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.5 FDD | R.5 FDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 7-17 | 7-17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.11 FDD | R.11 FDD | R.11 FDD |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.26 (OP.16 FDD) | | | OP.15 FDD | OP.15 FDD | OP.16 FDD |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 6 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| | Bands FDD_N | | -110.5 | | |
| RSRP Note2 | Bands FDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 6 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| | Bands FDD_N | | -114.5 | | |
| Io Note2 | Bands FDD_A Note 5 | dBm/4.5 MHz | -90.76 | (Io for Channel 1 +5.33dB) | |
| | Bands FDD_B1 Note 5, FDD_B2 Note 5, Note 6 | | -90.26 | | |
| | Bands FDD_C Note 5 | | -89.76 | | |
| | Bands FDD_D Note 5 | | -89.26 | | |
| | Bands FDD_E, FDD_F Note 5 | | -88.76 | | |
| | Bands FDD_G Note 5 | | -87.76 | | |
| | Bands FDD_H Note 5 | | -87.26 | | |
| | Bands FDD_N Note 5 | | -84.26 | | |

| | |
|---|---|
| Note 1: | This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. |
| Note 2: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 3: | See Table A.9.1.6.2-1 for the other parameters. |
| Note 4: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 5: | The test applies for E-UTRA operating bands in this band group which are supporting 5MHz + 5MHz channel bandwidth. |
| Note 6: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.20.3 Test Requirements

The test requirements defined in section A.9.1.6.3 shall apply to this test case.

## A.9.1.21 TDD RSRP for E-UTRAN Carrier Aggregation for 5MHz + 5MHz bandwidth

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.21.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.7.1.

### A.9.1.21.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.21.2-1 will replace the values of corresponding parameters in Tables A.9.1.7.2-1.

**Table A.9.1.21.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 5 | 5 | 5 |
| Measurement bandwidth | | $n_{PRB}$ | 10-15 | 10-15 | 10-15 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.4 TDD | R.4 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 7-17 | 7-17 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.11 TDD | | |
| OCNG Patterns defined in A.3.1.2.9 (OP.9 TDD) and A.3.2.2.10 (OP.10 TDD) | | | OP.9 TDD | OP.9 TDD | OP.10 TDD |
| Io Note2 | Bands TDD_A Note 5 | dBm/4.5MHz | -90.76 | (Io for Channel 1 +5.33dB) | |
| | Bands TDD_C Note 5 | | -89.76 | | |
| | Bands TDD_E Note 5 | | -88.76 | | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 3: See Table A.9.1.7.2-1 for the other parameters.<br>Note 4: E-UTRA operating band groups are as defined in Section 3.5.<br>Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 5MHz + 5MHz channel bandwidth. | | | | | |

### A.9.1.21.3 Test Requirements

The test requirements defined in section A.9.1.7.3 shall apply to this test case.

# A.9.1.22 RSRP for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD

## A.9.1.22.1 Test Purpose and Environment

The test case is applicable for TDD-FDD carrier aggregation capable UEs which have been configured with a downlink PCell in FDD and a downlink SCell in TDD.

The purpose of this test is to verify that the RSRP absolute and relative measurements accuracy in TDD-FDD carrier aggregation is within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2, the relative RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2 between the SCell and a neighbour cell, and the relative RSRP accuracy requirements of the PCell compared to the SCell defined in Clause 9.1.11.3.

## A.9.1.22.2 Test parameters

In this test case, Cell 1 is the PCell on the FDD primary component carrier, Cell 2 is the configured and activated SCell on the TDD secondary component carrier, and Cell 3 is the neighboring cell on the TDD secondary component carrier. The test parameters are given in Table A.9.1.22.2-1.

**Table A.9.1.22.2-1: RSRP TDD-FDD carrier aggregation test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note9] | | - | 6 | 6 |
| Uplink-downlink configuration[Note9] | | - | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 and A.3.1.1.2 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.2 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD), A.3.2.2.1 (OP.1 TDD), and A.3.2.2.2 (OP.2 TDD) | | | 5MHz: OP.15 FDD 10MHz: OP.1 FDD 20MHz: OP.11 FDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD |
|---|---|---|---|---|---|
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note 2 | | | | | |
| OCNG_RB Note 2 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | - | |
| | Bands FDD_C | | -116 | - | |
| | Bands FDD_D | | -115.5 | - | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | - | |
| | Bands FDD_G | | -114 | - | |
| | Bands FDD_H | | -113.5 | - | |
| | Bands TDD_A | | - | ($N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | - | | |
| | Bands TDD_E | | - | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -121 | - | - |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | - | - |
| | Bands FDD_C | | -120 | - | - |
| | Bands FDD_D | | -119.5 | - | - |
| | Bands FDD_E, FDD_F Note 6 | | -119 | - | - |
| | Bands FDD_G | | -118 | - | - |
| | Bands FDD_H | | -117.5 | - | - |
| | Bands TDD_A | | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | - | | |
| | Bands TDD_E | | - | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -87.76 + 10log($N_{RB,c}$/50) | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26 + 10log($N_{RB,c}$/50) | - | |
| | Bands FDD_C | | -86.76+ 10log($N_{RB,c}$/50) | - | |
| | Bands FDD_D | | -86.26+ 10log($N_{RB,c}$/50) | - | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76+ 10log($N_{RB,c}$/50) | - | |
| | Bands FDD_G | | -84.76+ 10log($N_{RB,c}$/50) | - | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_H | | -84.26+ 10log($N_{RB,c}$/50) | - | |
| | Bands TDD_A | | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | - | | |
| | Bands TDD_E | | - | | |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.22.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.23 RSRP for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD

### A.9.1.23.1 Test Purpose and Environment

The test case is applicable for TDD-FDD carrier aggregation capable UEs which have been configured with a downlink PCell in TDD and a downlink SCell in FDD.

The purpose of this test is to verify that the RSRP absolute and relative measurements accuracy in TDD-FDD carrier aggregation is within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2, the relative RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.11.2 between the SCell and a neighbour cell, and the relative RSRP accuracy requirements of the PCell compared to the SCell defined in Clause 9.1.11.3.

### A.9.1.23.2 Test parameters

In this test case, Cell 1 is the PCell on the TDD primary component carrier, Cell 2 is the configured and activated SCell on the FDD secondary component carrier, and Cell 3 is the neighboring cell on the FDD secondary component carrier. The test parameters are given in Table A.9.1.23.2-1.

**Table A.9.1.23.2-1: RSRP TDD-FDD carrier aggregation test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25 10MHz: $N_{RB,c}$ = 50 20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25 10MHz: $N_{RB,c}$ = 50 20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25 10MHz: $N_{RB,c}$ = 50 20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | - | - |
| Uplink-downlink configuration[Note1] | | 1 | - | - |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15 10MHz: 22-27 20MHz: 47-52 | 5MHz: 10-15 10MHz: 22-27 20MHz: 47-52 | 5MHz: 10-15 10MHz: 22-27 20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 and A.3.1.1.2 | | 5MHz: R.4 TDD 10MHz: R.0 TDD 20MHz: R.3 TDD | 5MHz: R.5 FDD 10MHz: R.0 FDD 20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.2 | | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD), A.3.2.2.1 (OP.1 TDD), and A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | 5MHz: OP.15 FDD 10MHz: OP.1 FDD 20MHz: OP.11 FDD | 5MHz: OP.16 FDD 10MHz: OP.2 FDD 20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA [Note 2] | | | | |
| OCNG_RB [Note 2] | | | | |
| | Bands FDD_A | dBm/15 kHz | - | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note 3 | Bands FDD_B1, FDD_B2 Note 10 | | - | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_C | | - | | |
| | Bands FDD_D | | - | | |
| | Bands FDD_E, FDD_F Note 9 | | - | | |
| | Bands FDD_G | | - | | |
| | Bands FDD_H | | - | | |
| | Bands TDD_A | | -117 | - | |
| | Bands TDD_C | | -116 | - | |
| | Bands TDD_E | | -115 | - | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note 4 | Bands FDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 10 | | - | | |
| | Bands FDD_C | | - | | |
| | Bands FDD_D | | - | | |
| | Bands FDD_E, FDD_F Note 9 | | - | | |
| | Bands FDD_G | | - | | |
| | Bands FDD_H | | - | | |
| | Bands TDD_A | | -121 | - | - |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io Note 4 | Bands FDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB+10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 10 | | - | | |
| | Bands FDD_C | | - | | |
| | Bands FDD_D | | - | | |
| | Bands FDD_E, FDD_F Note 9 | | - | | |
| | Bands FDD_G | | - | | |
| | Bands FDD_H | | - | | |
| | Bands TDD_A | | -87.76 + 10log($N_{RB,c}$/50) | - | |
| | Bands TDD_C | | -86.76 + 10log($N_{RB,c}$/50) | - | |
| | Bands TDD_E | | -85.76 + 10log($N_{RB,c}$/50) | - | |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

| | |
|---|---|
| Note 8: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 9: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 10: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.23.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.24 TDD RSRP for E-UTRAN Carrier Aggregation for 20MHz + 10MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.1.24.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.1.7.1.

### A.9.1.24.2 Test parameters

The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.1.24.2-1 will replace the values of corresponding parameters in Tables A.9.1.7.2-1.

**Table A.9.1.24.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | | Unit | Combination | Test 1 | | |
|---|---|---|---|---|---|---|
| | | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel}$ Note 1 | | MHz | 20MHz+10MHz | 20MHz: $N_{RB,c}$ = 100 | 10MHz: $N_{RB,c}$ = 50 | |
| | | | 10MHz+20MHz | 10MHz: $N_{RB,c}$ = 50 | 20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | | $n_{PRB}$ | 20MHz+10MHz | 47-52 | 22-27 | |
| | | | 10MHz+20MHz | 22-27 | 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 20MHz+10MHz | R.3 TDD | R.0 TDD | N/A |
| | | | 10MHz+20MHz | R.0 TDD | R3.TDD | |
| PDSCH allocation | | $n_{PRB}$ | 20MHz+10MHz | 38-61 | 13-36 | N/A |
| | | | 10MHz+20MHz | 13-36 | 38-61 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 20MHz+10MHz | R.10 TDD | R.6 TDD | |
| | | | 10MHz+20MHz | R.6 TDD | R.10 TDD | |
| OCNG Patterns defined in A.3.2.2 (TDD) | | | 20MHz+10MHz | OP.7 TDD | OP.1 TDD | OP.2 TDD |
| | | | 10MHz+20MHz | OP.1 TDD | OP.7 TDD | OP.8 TDD |
| Io Note2 | Bands TDD_A | dBm/$BW_{channel}$ | All | -87.76 + 10log($N_{RB,c}$/50) | N/A | |
| | Bands TDD_C | | | -86.76 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | | -85.76 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_A | dBm/ $BW_{channel}$ | All | N/A | (Io for Channel 1 +5.33dB) +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |

| | |
|---|---|
| Note 1: | This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. |
| Note 2: | Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 3: | See Table A.9.1.7.2-1 for the other parameters. |
| Note 4: | For each parameter, the allowed combinations are shown in separate rows. |

### A.9.1.24.3 Test Requirements

The test requirements defined in section A.9.1.7.3 shall apply to this test case.

## A.9.1.25 FDD intra-frequency absolute and relative RSRP accuracies in CRS based discovery signal

### A.9.1.25.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRP absolute and relative measurement accuracies in CRS based discovery signal are within the specified limits. This test will verify the requirements in Sections 9.1.14.2.

### A.9.1.25.2 Test parameters

In this test case, all cells are on the same carrier frequency. Both absolute and relative accuracies of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.25.2-1. In this test case, Cell 1 is the PCell and Cell 2 is the target cell. The Cell 2 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.25.2-1: RSRP FDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | |
| $BW_{channel}$ | | MHz | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| DTMC period | | ms | N/A | 160 |
| DTMC period offset | | | N/A | 10 |
| Discovery signal occasion duration | | ms | N/A | 1 |
| Time offset between cells | | µs | 2.3 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -106 | -106 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s/I_{ot}$ | | dB | 2.5 | -6 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -100 | -105 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -70.27 | -70.27 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s/N_{oc}$ | | dB | 6 | 1 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.25.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.2.

## A.9.1.26 TDD intra-frequency absolute and relative RSRP accuracies in CRS based discovery signal

### A.9.1.26.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative measurement accuracies in CRS based discovery signal are within the specified limits. This test will verify the requirements in Sections 9.1.14.2.

## A.9.1.26.2 Test parameters

In this test case all cells are on the same carrier frequency. Both absolute and relative accuracies of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.26.2-1. In this test case, Cell 1 is the PCell and Cell 2 is the target cell. The Cell 2 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.26.2-1: RSRP TDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | |
| $BW_{channel}$ | | MHz | 10 | |
| Special subframe configuration[Note1] | | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| DTMC period | | ms | N/A | 160 |
| DTMC period offset | | | N/A | 10 |
| Discovery signal occasion duration | | ms | N/A | 2 |
| Time offset between cells | | µs | 2.3 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -106 | -106 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / I_{ot}$ | | dB | 2.5 | -6 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -100 | -105 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -70.27 | -70.27 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 |
| Propagation condition | | - | AWGN | |

| | |
|---|---|
| Note 1: | For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211. |
| Note 2: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.26.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14. 2.

## A.9.1.27 FDD—FDD inter-frequency absolute and relative RSRP accuracies in CRS based discovery signal

### A.9.1.27.1 Test Purpose and Environment

The purpose of this test is to verify that the CRS RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.2 for FDD—FDD inter frequency measurements.

### A.9.1.27.2 Test parameters

In this set of test case the cells are on different carrier frequencies. Both absolute and relative accuracy of CRS RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.27.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap and a DMTC configuation.

**Table A.9.1.27.2-1: CRS RSRP FDD—FDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Gap Pattern Id | | 0 | - |
| gapOffset | ms | 9 | |
| DMTC period | ms | - | 160 |
| DMTC period offset | ms | - | 10 |
| Discovery signal occasion duration | ms | - | 1 |
| Time offset between cells | µs | - | 3 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |

| | | | | |
|---|---|---|---|---|
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 9 | dBm/15 kHz | ($N_{oc}$ for Channel 2 +6dB) | -115 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -114.5 |
| | Bands FDD_C | | | -114 |
| | Bands FDD_D | | | -113.5 |
| | Bands FDD_E, FDD_F Note 5 | | | -113 |
| | Bands FDD_G Note 7 | | | -112 |
| | Bands FDD_H | | | -111.5 |
| $\hat{E}_s/I_{ot}$ | | dB | 13 | -6 |
| RSRP Note3 | Bands FDD_A Note 9 | dBm/15 kHz | (RSRP for Cell 2 +25dB) | -121 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -120.5 |
| | Bands FDD_C | | | -120 |
| | Bands FDD_D | | | -119.5 |
| | Bands FDD_E, FDD_F Note 5 | | | -119 |
| | Bands FDD_G Note 7 | | | -118 |
| | Bands FDD_H | | | -117.5 |
| Io Note3 | Bands FDD_A Note 9 | dBm/9 MHz | (Io for Channel 2 +18.24dB) | -86.25 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -85.75 |
| | Bands FDD_C | | | -85.25 |
| | Bands FDD_D | | | -84.75 |
| | Bands FDD_E, FDD_F Note 5 | | | -84.25 |
| | Bands FDD_G Note 7 | | | -83.25 |
| | Bands FDD_H | | | -82.75 |
| $\hat{E}_s/N_{oc}$ | | dB | 13 | -6 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

| | |
|---|---|
| Note 8: | DMTC is provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test. |
| Note 9: | Except Band 32, Band 75, Band 76. |
| Note 10: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.27.3 Test Requirements

The CRS RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.2.

## A.9.1.28 TDD—TDD inter-frequency absolute and relative RSRP accuracies in CRS based discovery signal

### A.9.1.28.1 Test Purpose and Environment

The purpose of this test is to verify that the CRS RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.2 for TDD—TDD inter frequency measurements.

### A.9.1.28.2 Test parameters

In this set of test case the cells are on different carrier frequencies. Both absolute and relative accuracy of CRS RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.28.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap and a DMTC configuation.

**Table A.9.1.28.2-1: CRS RSRP TDD—TDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note1] | | 1 | |
| Gap Pattern Id | | 0 | - |
| gapOffset | ms | 9 | |
| DMTC period | ms | - | 160 |
| DMTC period offset | ms | - | 10 |
| Discovery signal occasion duration | ms | - | 2 |
| Time offset between cells | µs | - | 3 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note2] | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | ( $N_{oc}$ for Channel 2 +6dB) | -115 |
| | Bands TDD_C | | | -114 |
| | Bands TDD_E | | | -113 |
| $\hat{E}_s / I_{ot}$ | | dB | 13 | -6 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | (RSRP for Cell 2 +25dB) | -121 |
| | Bands TDD_C | | | -120 |
| | Bands TDD_E | | | -119 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | (Io for Channel 2 +18.24dB) | -86.25 |
| | Bands TDD_C | | | -85.25 |
| | Bands TDD_E | | | -84.25 |
| $\hat{E}_s / N_{oc}$ | | dB | 13 | -6 |
| Propagation condition | | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: DMTC is provided to the UE in the measDS-Config (in TS36.331) before the beginning of test

### A.9.1.28.3 Test Requirements

The CRS RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.2.

## A.9.1.29 FDD intra frequency absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal

### A.9.1.29.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI- RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.3 for FDD intra frequency measurements.

### A.9.1.29.2 Test parameters

In this set of test case all cells are on the same carrier frequencies. Both absolute and relative accuracy of CSI- RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.29.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The intra frequency measurements are supported by a DMTC configuration.

**Table A.9.1.29.2-1: CSI-RSRP FDD Intra frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| DMTC period | ms | 160 | |
| DMTC period offset | ms | 10 | |

| | | | | |
|---|---|---|---|---|
| Discovery signal occasion duration | | ms | 1 | |
| CSI-RS resource configuration | | | 2 | 4 |
| CSI-RS periodicity | | ms | 10 | |
| CSI-RS subframe offset | | ms | 0 | |
| CSI-RS individual offset[2] | | dB | 0 | 0 |
| CSI-RS muting | | | Enable | Enable |
| Time offset between cells | | µs | - | 2.3 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |
| p-C-r10[2] | | dB | -6 | -6 |
| $N_{oc}$ [Note2] | Bands FDD_A Note 9 | dBm/15 kHz | -116 | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -115.5 | |
| | Bands FDD_C | | -115 | |
| | Bands FDD_D | | -114.5 | |
| | Bands FDD_E, FDD_F Note 5 | | -114 | |
| | Bands FDD_G Note 7 | | -113 | |
| | Bands FDD_H | | -112.5 | |
| CRS $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s / I_{ot}$ | | dB | 6.46 | 0.24 |
| RSRP[Note3] | Bands FDD_A Note 9 | dBm/15 kHz | -113 | -117 |
| | Bands FDD_B1, FDD_B2 Note 10 | | -112.5 | -116.5 |
| | Bands FDD_C | | -112 | -116 |
| | Bands FDD_D | | -111.5 | -115.5 |
| | Bands FDD_E, FDD_F Note 5 | | -111 | -115 |
| | Bands FDD_G Note 7 | | -110 | -114 |
| | Bands FDD_H | | -109.5 | -113.5 |
| CSI-RSRP [Note3] | Bands FDD_A Note 9 | dBm/15 kHz | (RSRP for Cell 1 +6dB) | (RSRP for Cell 2 +6dB) |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A Note 9 | dBm/9 MHz | -82.43 | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -81.93 | |
| | Bands FDD_C | | -81.43 | |
| | Bands FDD_D | | -80.93 | |
| | Bands FDD_E, FDD_F Note 5 | | -80.43 | |
| | Bands FDD_G Note 7 | | -79.43 | |
| | Bands FDD_H | | -78.93 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| CSI-RS $\hat{E}_s / N_{oc}$ | | dB | 9 | 5 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: DMTC is provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test.

Note 9: Except Band 32, Band 75, Band 76.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.29.3 Test Requirements

The CSI- RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.3.

## A.9.1.30 TDD intra frequency absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal

### A.9.1.30.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI- RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.3 for TDD intra frequency measurements.

### A.9.1.30.2 Test parameters

In this set of test case all cells are on the same carrier frequencies. Both absolute and relative accuracy of CSI- RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.30.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The intra frequency measurements are supported by a DMTC configuation.

**Table A.9.1.30.2-1: CSI-RSRP TDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | |
| $BW_{channel}$ | | MHz | 10 | |
| Special subframe configuration[Note1] | | | 6 | |
| Uplink-downlink configuration[Note1] | | | 1 | |
| DMTC period | | ms | 160 | |
| DMTC period offset | | ms | 10 | |
| Discovery signal occasion duration | | ms | 2 | |
| CSI-RS resource configuration | | | 2 | 4 |
| CSI-RS periodicity | | ms | 10 | |
| CSI-RS subframe offset | | ms | 0 | |
| CSI-RS individual offset[2] | | dB | 0 | 0 |
| CSI-RS muting | | | Enable | Enable |
| Time offset between cells | | µs | - | 2.3 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |
| p-C-r10[2] | | dB | -6 | -6 |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -116 | |
| | Bands TDD_C | | -115 | |
| | Bands TDD_E | | -114 | |
| CRS $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s / I_{ot}$ | | dB | 6.46 | 0.24 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -113 | -117 |
| | Bands TDD_C | | -112 | -116 |
| | Bands TDD_E | | -111 | -115 |
| CSI-RSRP [Note4] | Bands TDD_A | dBm/15 kHz | (RSRP for Cell 1 +6dB) | (RSRP for Cell 2 +6dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -82.43 | |
| | Bands TDD_C | | -81.43 | |
| | Bands TDD_E | | -80.43 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| CSI-RS $\hat{E}_s / N_{oc}$ | | dB | 9 | 5 |
| Propagation condition | | - | AWGN | |
| Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211. | | | | |

| | |
|---|---|
| Note 2: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 7: | DMTC is provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test. |

### A.9.1.30.3 Test Requirements

The CSI- RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.3.

## A.9.1.31 FDD—FDD inter-frequency absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal

### A.9.1.31.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.3 for FDD—FDD inter frequency measurements.

### A.9.1.31.2 Test parameters

In this set of test case the cells are on different carrier frequencies. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.31.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap and two DMTC configurations which one is for cell1 and the other is for cell2.

**Table A.9.1.31.2-1: CSI-RSRP FDD—FDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Gap Pattern Id | | 0 | - |
| gapOffset | ms | 9 | |
| DMTC period | ms | 160 | 160 |
| DMTC period offset | ms | 0 | 10 |
| Discovery signal occasion duration | ms | 1 | 1 |
| CSI-RS resource configuration | | 2 | 4 |
| CSI-RS periodicity | ms | 10 | |
| CSI-RS subframe offset | ms | 0 | |
| CSI-RS individual offset[2] | dB | 0 | 0 |
| CSI-RS muting | | Enable | Enable |
| Time offset between cells | µs | - | 3 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD |
|---|---|---|---|---|
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| p-C-r10[2] | | dB | 0 | -6 |
| $N_{oc}$ Note2 | Bands FDD_A Note 9 | dBm/15 kHz | ($N_{oc}$ for Channel 2 +6dB) | -115 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -114.5 |
| | Bands FDD_C | | | -114 |
| | Bands FDD_D | | | -113.5 |
| | Bands FDD_E, FDD_F Note 5 | | | -113 |
| | Bands FDD_G Note 7 | | | -112 |
| | Bands FDD_H | | | -111.5 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | 13 | -6 |
| CSI-RS $\hat{E}_s / I_{ot}$ | | dB | 13 | 0 |
| RSRP Note3 | Bands FDD_A Note 9 | dBm/15 kHz | (RSRP for Cell 2 +25dB) | -121 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -120.5 |
| | Bands FDD_C | | | -120 |
| | Bands FDD_D | | | -119.5 |
| | Bands FDD_E, FDD_F Note 5 | | | -119 |
| | Bands FDD_G Note 7 | | | -118 |
| | Bands FDD_H | | | -117.5 |
| CSI-RSRP Note3 | Bands FDD_A Note 9 | dBm/15 kHz | (RSRP for Cell 1 +0dB) | (RSRP for Cell 2 +6dB) |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A Note 9 | dBm/9 MHz | (Io for Channel 2 +18.24dB) | -86.25 |
| | Bands FDD_B1, FDD_B2 Note 10 | | | -85.75 |
| | Bands FDD_C | | | -85.25 |
| | Bands FDD_D | | | -84.75 |
| | Bands FDD_E, FDD_F Note 5 | | | -84.25 |
| | Bands FDD_G Note 7 | | | -83.25 |
| | Bands FDD_H | | | -82.75 |

| | | | |
|---|---|---|---|
| CRS $\hat{E}_s/N_{oc}$ | dB | 13 | -6 |
| CSI-RS $\hat{E}_s/N_{oc}$ | dB | 13 | 0 |
| Propagation condition | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: DMTC is provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test.
Note 9: Except Band 32, Band 75, Band 76.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.31.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.3.

## A.9.1.32 TDD—TDD inter-frequency absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal

### A.9.1.32.1 Test Purpose and Environment

The purpose of this test is to verify that the CSI-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.14.3 for TDD—TDD inter frequency measurements.

### A.9.1.32.2 Test parameters

In this set of test case the cells are on different carrier frequencies. Both absolute and relative accuracy of CSI-RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.32.2-1. In this test case, Cell 1 is the PCell and Cell 2 the target cell. The inter frequency measurements are supported by a measurement gap and two DMTC configurations which one is for cell 1 and the other is for cell2.

**Table A.9.1.32.2-1: CSI-RSRP TDD—TDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note1] | | 1 | |
| Gap Pattern Id | | 0 | - |
| gapOffset | ms | 9 | |
| DMTC period | ms | 160 | 160 |
| DMTC period offset | ms | 0 | 10 |
| Discovery signal occasion duration | ms | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| CSI-RS resource configuration | | | 2 | 4 |
| CSI-RS periodicity | | ms | 10 | |
| CSI-RS subframe offset | | ms | 0 | |
| CSI-RS individual offset[2] | | dB | 0 | 0 |
| CSI-RS muting | | | Enable | Enable |
| Time offset between cells | | µs | - | 3 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| p-C-r10[2] | | dB | 0 | -6 |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | ($N_{oc}$ for Channel 2 +6dB) | -115 |
| | Bands TDD_C | | | -114 |
| | Bands TDD_E | | | -113 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | 13 | -6 |
| CSI-RS $\hat{E}_s / I_{ot}$ | | dB | 13 | 0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | (RSRP for Cell 2 +25dB) | -121 |
| | Bands TDD_C | | | -120 |
| | Bands TDD_E | | | -119 |
| CSI-RSRP [Note4] | Bands TDD_A | dBm/15 kHz | (RSRP for Cell 1 +0dB) | (RSRP for Cell 2 +6dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | (Io for Channel 2 +18.24dB) | -86.25 |
| | Bands TDD_C | | | -85.25 |
| | Bands TDD_E | | | -84.25 |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 13 | -6 |
| CSI-RS $\hat{E}_s / N_{oc}$ | | dB | 13 | 0 |
| Propagation condition | | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and

shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: DMTC is provided to the UE in the measDS-Config (in TS36.331) before the beginning of test.

### A.9.1.32.3 Test Requirements

The CSI-RSRP measurement accuracy shall fulfil the requirements in sections 9.1.14.3.

## A.9.1.33 FDD absolute and relative RSRP accuracies for E-UTRAN Carrier Aggregation in CRS based discovery signal

### A.9.1.33.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRP absolute and relative measurement accuracies in carrier aggregation in CRS based discovery signal are within the specified limits. This test will verify the absolute RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.15.1.2, and the relative RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.15.1.2. The test will also verify the primary and secondary component carrier relative RSRP accuracy requirement defined in Clause 9.1.15.1.3.

### A.9.1.33.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier and activated, and Cell3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.33.2-1. The Cell 3 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.33.2-1: RSRP FDD carrier aggregation test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| DMTC period | ms | N/A | N/A | 160 |
| DMTC period offset | | N/A | N/A | 10 |
| Discovery signal occasion duration | ms | N/A | N/A | 1 |
| Timing offset to cell1 | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | |

| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
|---|---|---|---|---|---|
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RANote1 | | | | | |
| OCNG_RBNote | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| Io Note3 | Bands FDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -87.26 | | |
| | Bands FDD_C | | -86.76 | | |
| | Bands FDD_D | | -86.26 | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 | | |
| | Bands FDD_G | | -84.76 | | |
| | Bands FDD_H | | -84.26 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.33.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 3 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.1.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.1.2
- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.15.1.3.

## A.9.1.34 TDD absolute and relative RSRP accuracies for E-UTRAN Carrier Aggregation in CRS based discovery signal

### A.9.1.34.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRP absolute and relative measurement accuracies in carrier aggregation in CRS based discovery signal are within the specified limits. This test will verify the absolute RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.15.1.2, and the relative RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.15.1.2. The test will also verify the primary and secondary component carrier relative RSRP accuracy requirement defined in Clause 9.1.15.1.3.

### A.9.1.34.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier and activated, and Cell3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.34.2-1. The Cell 3 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.34.2-1: Carrier aggregation RSRP test parameters for TDD**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| DMTC period | ms | N/A | N/A | 160 |
| DMTC period offset | | N/A | N/A | 10 |
| Discovery signal occasion duration | ms | N/A | N/A | 2 |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink/downlink configuration[Note1] | | 1 | | |
| Timing offset to Cell 1 | μs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands TDD_C | | -86.76 | | |
| | Bands TDD_E | | -85.76 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.34.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following three perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 3 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.1.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.1.2

- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.15.1.3.

## A.9.1.35 FDD absolute and relative CSI-RSRP accuracies for E-UTRAN Carrier Aggregation in CSI-RS based discovery signal

### A.9.1.35.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD CSI-RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute CSI-RSRP accuracy requirements of the primary component carrier defined in clause 9.1.15.2.1, the absolute CSI-RSRP accuracy requirements of the secondary

component carrier defined in clause 9.1.15.2.2, and the relative CSI-RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.15.2.2. The test will also verify the primary and secondary component carrier relative CSI-RSRP accuracy requirement defined in Clause 9.1.15.2.3.

## A.9.1.35.2 Test parameters

In this set of cases cell1 is PCell on the primary component carrier, cell2 is SCell on the secondary component carrier and activated, and cell3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.35.2-1. This set is supported by two DMTC configurations which one is for cell1 and the other is for cell2 and cell3.

**Table A.9.1.35.2-1: CSI-RSRP FDD carrier aggregation test parameters**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | | 1 | 2 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 |
| Timing offset to cell1 | | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| DMTC period | | ms | 160 | 160 | |
| DMTC period offset | | ms | 0 | 10 | |
| Discovery signal occasion duration | | ms | 1 | 1 | |
| CSI-RS resource configuration | | | 2 | 4 | 6 |
| CSI-RS periodicity | | ms | 10 | 10 | 10 |
| CSI-RS subframe offset | | ms | 0 | 0 | 0 |
| CSI-RS individual offset[2] | | dB | 0 | 0 | 0 |
| CSI-RS muting | | | Enable | Enable | Enable |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RANote1 | | | | | |
| OCNG_RBNote | | | | | |
| p-C-r10[2] | | dB | -6 | -6 | -6 |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| CRS $\hat{E}_s/I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s/I_{ot}$ | | dB | 2 | 6.46 | 0.24 |
| RSRP[Note3] | Bands FDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F [Note 6] | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| CSI-RSRP[Note3] | Bands FDD_A | dBm/15 kHz | -115 | (CSI-RSRP for Cell 1 +8dB) | (CSI-RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -114.5 | | |
| | Bands FDD_C | | -114 | | |
| | Bands FDD_D | | -113.5 | | |
| | Bands FDD_E, FDD_F [Note 6] | | -113 | | |
| | Bands FDD_G | | -112 | | |
| | Bands FDD_H | | -111.5 | | |
| Io[Note3] | Bands FDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -87.26 | | |
| | Bands FDD_C | | -86.76 | | |
| | Bands FDD_D | | -86.26 | | |
| | Bands FDD_E, FDD_F [Note 6] | | -85.76 | | |
| | Bands FDD_G | | -84.76 | | |
| | Bands FDD_H | | -84.26 | | |
| CRS $\hat{E}_s/N_{oc}$ | | dB | -4 | 3 | -1 |
| CSI-RS $\hat{E}_s/N_{oc}$ | | dB | 2 | 9 | 5 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note9: DMTC configurations are provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.35.3 Test Requirements

In the test, the performance of CSI-RSRP measurements is verified from following four perspectives:

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.15.2.1.

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.2.2.

- The relative accuracy of intra-frequency CSI-RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.2.2.

- The relative accuracy of inter-frequency CSI-RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.15.2.3.

# A.9.1.36 TDD absolute and relative CSI-RSRP accuracies for E-UTRAN Carrier Aggregation in CSI-RS based discovery signal

## A.9.1.36.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD CSI-RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute CSI-RSRP accuracy requirements of the primary component carrier defined in clause 9.1.15.2.1, the absolute CSI-RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.15.2.2, and the relative CSI-RSRP accuracy requirements of the secondary component carrier defined in clause 9.1.15.2.2. The test will also verify the primary and secondary component carrier relative CSI-RSRP accuracy requirement defined in Clause 9.1.15.2.3.

## A.9.1.36.2 Test parameters

In this set of cases cell1 is PCell on the primary component carrier, cell2 is SCell on the secondary component carrier and activated, and cell3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.36.2-1. This set is supported by two DMTC configurations which one is for cell1 and the other is for cell2 and cell3.

**Table A.9.1.36.2-1: CSI-RSRP TDD carrier aggregation test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | MHz | 10 | | |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink/downlink configuration[Note1] | | 1 | | |
| Timing offset to Cell 1 | μs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| DMTC period | ms | 160 | 160 | |
| DMTC period offset | ms | 0 | 10 | |
| Discovery signal occasion duration | ms | 2 | 2 | |
| CSI-RS resource configuration | | 2 | 4 | 6 |
| CSI-RS periodicity | ms | 10 | 10 | 10 |
| CSI-RS subframe offset | ms | 0 | 0 | 0 |
| CSI-RS individual offset[2] | dB | 0 | 0 | 0 |
| CSI-RS muting | | Enable | Enable | Enable |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | |

| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
|---|---|---|---|---|---|
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| p-C-r10[2] | | dB | -6 | -6 | -6 |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -117 | ($N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| CRS $\hat{E}_s/I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s/I_{ot}$ | | dB | 2 | 6.46 | 0.24 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| CSI-RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -115 | (CSI-RSRP for Cell 1 +8dB) | (CSI-RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -114 | | |
| | Bands TDD_E | | -113 | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -87.76 | (Io for Channel 1 +5.33dB) | |
| | Bands TDD_C | | -86.76 | | |
| | Bands TDD_E | | -85.76 | | |
| CRS $\hat{E}_s/N_{oc}$ | | dB | -4 | 3 | -1 |
| CSI-RS $\hat{E}_s/N_{oc}$ | | dB | 2 | 9 | 5 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: DMTC configurations are provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test

## A.9.1.36.3 Test Requirements

In the test, the performance of CSI-RSRP measurements is verified from following four perspectives:

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.15.2.1.

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.2.2.

- The relative accuracy of intra-frequency CSI-RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.15.2.2.

- The relative accuracy of inter-frequency CSI-RSRP measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.15.2.3.

# A.9.1.37 3 DL PCell in FDD RSRP for E-UTRAN in Carrier Aggregation

## A.9.1.37.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in FDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.37.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2 and cell 4 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. Cell 3 and cell 5 are neighbouring cells on secondary component carriers SCC1 and SCC2 respectively. The test parameters are given in Table A.9.1.37.2-1.

**Table A.9.1.37.2-1: 3 Downlink PCell in FDD RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | - | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | - | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note2 | | | | | | | |
| OCNG_RB Note2 | | | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | - | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -117 | - | | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -121 | - | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/50) | - | | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 4: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 8: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 9: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 10: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.37.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 7 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.38 3 DL PCell in TDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.38.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in TDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.38.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2 and cell 4 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. Cell 3 and cell 5 are neighbouring cells on secondary component carriers SCC1 and SCC2 respectively. The test parameters are given in Table A.9.1.38.2-1.

**Table A.9.1.38.2-1: 3 Downlink PCell in TDD RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | 6 | - | | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Uplink/downlink configuration[Note1] | | | 1 | - | | - | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | | 5MHz:<br>R.4 TDD<br>10MHz:<br>R.0 TDD<br>20MHz:<br>R.3 TDD | 5MHz:<br>R.5 FDD<br>10MHz:<br>R.0 FDD<br>20MHz:<br>R.4 FDD | - | 5MHz:<br>R.5 FDD<br>10MHz:<br>R.0 FDD<br>20MHz:<br>R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 FDD<br>10MHz:<br>R.6 FDD<br>20MHz:<br>R.10 FDD | 5MHz:<br>R.11 FDD<br>10MHz:<br>R.6 FDD<br>20MHz:<br>R.10 FDD | 5MHz:<br>R.11 FDD<br>10MHz:<br>R.6 FDD<br>20MHz:<br>R.10 FDD | 5MHz:<br>R.11 FDD<br>10MHz:<br>R.6 FDD<br>20MHz:<br>R.10 FDD |
| OCNG Patterns defined in A.3.2. | | | 5MHz:<br>OP.9 TDD<br>10MHz:<br>OP.1 TDD<br>20MHz:<br>OP.7 TDD | 5MHz:<br>OP.15 FDD<br>10MHz:<br>OP.1 FDD<br>20MHz:<br>OP.11 FDD | 5MHz:<br>OP.16 FDD<br>10MHz:<br>OP.2 FDD<br>20MHz:<br>OP.12 FDD | 5MHz:<br>OP.15 FDD<br>10MHz:<br>OP.1 FDD<br>20MHz:<br>OP.11 FDD | 5MHz:<br>OP.16 FDD<br>10MHz:<br>OP.2 FDD<br>20MHz:<br>OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA[Note1] | | | | | | | |
| OCNG_RB[Note1] | | | | | | | |
| $N_{oc}$ [Note3] | Bands FDD_A | dBm/15 kHz | - | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | | | | | |
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| | Bands TDD_A | | -117 | - | | - | |
| | Bands TDD_C | | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands FDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 [Note 10] | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| | Bands TDD_A | | -121 | - | - | - | - |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| $Io^{Note4}$ | Bands FDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | |
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| | Bands TDD_A | | -87.76+10log($N_{RB,c}$/50) | - | | - | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2Note8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

## A.9.1.38.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 7 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.39 3 DL FDD RSRP for E-UTRAN in Carrier Aggregation

## A.9.1.39.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.39.2 Test parameters

In this set of test cases there are five cells on three carrier frequencies. Cell 1 is PCell on channel 1, and cell 2 and cell 4 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. Cell 3 and cell 5 are neighbouring cells on secondary component carriers SCC1 and SCC2 respectively. The parameters for the test are listed in Table A.9.1.39.2-1.

**Table A.9.1.39.2-1: 3 DL FDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #1, cell #2 and cell #3)**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_H | | -113.5 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -87.76 +10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -87.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -86.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.39.2-2: 3 DL FDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #4 and cell #5)**

| Parameter | Unit | Cell 4 | Cell 5 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27 | |

| | | | | |
|---|---|---|---|---|
| | | | 20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |

| | | | |
|---|---|---|---|
| Time alignment error relative to cell 2[Note 7] | | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.39.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.40 3 DL TDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.40.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.40.2 Test parameters

In this set of test cases there are five cells on three carrier frequencies. Cell 1 is PCell on channel 1, and cell 2 and cell 4 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. Cell 3 and cell 5 are neighbouring

cells on secondary component carriers SCC1 and SCC2 respectively. The parameters for the test are listed in Table A.9.1.40.2-1.

**Table A.9.1.40.2-1: 3 DL TDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #1, cell #2 and cell #3)**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | |
| $BW_{channel}$ | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | | 6 | | |
| Uplink/downlink configuration[Note1] | | | 1 | | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76 + 10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -85.76 + 10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 [Note 7] | | | - | ≤ TAE | - |

| | |
|---|---|
| Note 1: | For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211. |
| Note 2: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |

**Table A.9.1.40.2-2: 3 DL TDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #4 and cell #5)**

| Parameter | | Unit | Cell 4 | Cell 5 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 3 | |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |

| | | | | |
|---|---|---|---|---|
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.40.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following four perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.41 FD-FDD RSRP Intra frequency case for UE category 0

## A.9.1.41.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.13.1 and 9.1.13.2 for FD-FDD intra frequency RSRP measurements for UE category 0.

## A.9.1.41.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.41.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.41.2-1: FD-FDD RSRP Intra frequency test parameters for UE category 0**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.3 | | | R.13 FDD | - | R.13 FDD | - | R.13 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1 | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | Bands FDD-0_A Note 7 | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-0_B | | | | | | -115.5 | |
| | Bands FDD-0_C | | | | | | -115 | |
| | Bands FDD-0_D | | | | | | -114.5 | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -114 | |
| | Bands FDD-0_G Note 6 | | | | | | -113 | |
| | Bands FDD-0_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD-0_A Note 7 | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-0_B | | | | | | -112.5 | -116.5 |
| | Bands FDD-0_C | | | | | | -112 | -116 |
| | Bands FDD-0_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -111 | -115 |
| | Bands FDD-0_G Note 6 | | | | | | -110 | -114 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD-0_H | | | | | | -109.5 | -113.5 |
| $Io^{Note3}$ | Bands FDD-0_A Note 7 | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands FDD-0_B | | | | | | -81.93 | |
| | Bands FDD-0_C | | | | | | -81.43 | |
| | Bands FDD-0_D | | | | | | -80.93 | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -80.43 | |
| | Bands FDD-0_G Note 6 | | | | | | -79.43 | |
| | Bands FDD-0_H | | | | | | -78.93 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.
Note 6: Except Band 29.
Note 7: Except Band 32, Band 75, Band 76.

### A.9.1.41.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.13.1 and 9.1.13.2.

## A.9.1.42 HD-FDD RSRP Intra frequency case for UE category 0

### A.9.1.42.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.13.1 and 9.1.13.2 for HD-FDD intra frequency RSRP measurements for UE category 0.

### A.9.1.42.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.42.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.42.2-1: HD-FDD RSRP Intra frequency test parameters for UE category 0**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.4 | | R.1 HD-FDD | - | R.1 HD-FDD | - | R.1 HD-FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.3 | | R.3 HD-FDD | | R.3 HD-FDD | | R.3 HD-FDD | |
| OCNG Patterns defined in A.3.2.1 | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-0_A Note 7 | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-0_B | | | | | | -115.5 | |
| | Bands FDD-0_C | | | | | | -115 | |
| | Bands FDD-0_D | | | | | | -114.5 | |
| | Bands FDD-0_E, FDD-0_F Note 5 | | | | | | -114 | |
| | Bands FDD-0_G Note 6 | | | | | | -113 | |
| | Bands FDD-0_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD-0_A Note 7 | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-0_B | | | | | | -112.5 | -116.5 |
| | Bands FDD-0_C | | | | | | -112 | -116 |
| | Bands FDD-0_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -111 | -115 |
| | Bands FDD-0_G Note 6 | | | | | | -110 | -114 |
| | Bands FDD-0_H | | | | | | -109.5 | -113.5 |
| Io Note3 | Bands FDD-0_A Note 7 | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands FDD-0_B | | | | | | -81.93 | |
| | Bands FDD-0_C | | | | | | -81.43 | |
| | Bands FDD-0_D | | | | | | -80.93 | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -80.43 | |
| | Bands FDD-0_G Note 6 | | | | | | -79.43 | |
| | Bands FDD-0_H | | | | | | -78.93 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

Note 6: Except Band 29.

Note 7: Except Band 32, Band 75, Band 76.

### A.9.1.42.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.13.1 and 9.1.13.2.

# A.9.1.43 TDD RSRP Intra frequency case for UE category 0

## A.9.1.43.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.13.1 and 9.1.13.2 for TDD intra frequency RSRP measurements for UE category 0.

## A.9.1.43.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.43.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.43.2-1: TDD RSRP Intra frequency test parameters for UE category 0**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.5 | | | R.12 TDD | - | R.12 TDD | - | R.12 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note2]<br>OCNG_RB[Note2] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note3] | Bands TDD-0_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands TDD-0_C | | | | | | -115 | |
| | Bands TDD-0_E | | | | | | -114 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ [Note4] | | dB | 2.5 | -6 | 2.5 | -6 | 0.5 | -5.76 |
| RSRP[Note4] | Bands TDD-0_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands TDD-0_C | | | | | | -112 | -116 |
| | Bands TDD-0_E | | | | | | -111 | -115 |
| Io[Note4] | Bands TDD-0_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands TDD-0_C | | | | | | -81.43 | |
| | Bands TDD-0_E | | | | | | -80.43 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

| | |
|---|---|
| Note 1: | For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211. |
| Note 2: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.43.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.13.1 and 9.1.13.2.

## A.9.1.44 4 DL CA PCell in FDD FDD-TDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.44.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD-TDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in FDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.44.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4 and cell 6 are activated SCells on secondary component carriers SCC1, SCC2 and SCC3 respectively. Cell 3, cell 5 and cell 7 are neighbouring cells on secondary component carriers SCC1, SCC2 and SCC3 respectively. The test parameters are given in Table A.9.1.44.2-1.

**Table A.9.1.44.2-1: 4 Downlink PCell in FDD-TDD RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6 | Cell 7 |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | - | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | - | 1 | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel | | 5MHz:<br>R.5 FDD<br>10MHz:<br>R.0 FDD<br>20MHz:<br>R.4 FDD | 5MHz:<br>R.4 TDD<br>10MHz:<br>R.0 TDD<br>20MHz:<br>R.3 TDD | - | 5MHz:<br>R.4 TDD<br>10MHz:<br>R.0 TDD<br>20MHz:<br>R.3 TDD | - | 5MHz:<br>R.4 TDD<br>10MHz:<br>R.0 TDD<br>20MHz:<br>R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel | | 5MHz:<br>R.11 FDD<br>10MHz:<br>R.6 FDD<br>20MHz:<br>R.10 FDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD | 5MHz:<br>R.11 TDD<br>10MHz:<br>R.6 TDD<br>20MHz:<br>R.10 TDD |
| OCNG Patterns | | 5MHz:<br>OP.15 FDD<br>10MHz:<br>OP.1 FDD<br>20MHz:<br>OP.11 FDD | 5MHz:<br>OP.9 TDD<br>10MHz:<br>OP.1 TDD<br>20MHz:<br>OP.7 TDD | 5MHz:<br>OP.10 TDD<br>10MHz:<br>OP.2 TDD<br>20MHz:<br>OP.8 TDD | 5MHz:<br>OP.9 TDD<br>10MHz:<br>OP.1 TDD<br>20MHz:<br>OP.7 TDD | 5MHz:<br>OP.10 TDD<br>10MHz:<br>OP.2 TDD<br>20MHz:<br>OP.8 TDD | 5MHz:<br>OP.9 TDD<br>10MHz:<br>OP.1 TDD<br>20MHz:<br>OP.7 TDD | 5MHz:<br>OP.10 TDD<br>10MHz:<br>OP.2 TDD<br>20MHz:<br>OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OCNG_RA[Note2] | | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | | |
| $N_{oc}$[Note3] | Bands TDD_A | dBm/15 kHz | - | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | | | | |
| | Bands TDD_E | | | | | | | | |
| | Bands FDD_A | | -117 | - | | - | | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | | | |
| | Bands FDD_C | | -116 | | | | | | |
| | Bands FDD_D | | -115.5 | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | | | |
| | Bands FDD_G | | -114 | | | | | | |
| | Bands FDD_H | | -113.5 | | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | | | | |
| | Bands TDD_E | | | | | | | | |
| | Bands FDD_A | | -121 | - | - | - | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | | | |
| | Bands FDD_C | | -120 | | | | | | |
| | Bands FDD_D | | -119.5 | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | | | |
| | Bands FDD_G | | -118 | | | | | | |
| | Bands FDD_H | | -117.5 | | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel4}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | | | | |
| | Bands TDD_E | | | | | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/50) | - | | - | | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Timing offset to cell 1 | µs | - | 0 | 3 | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | - | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | - | - | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 4 Note 8 | | - | - | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.44.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 10 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.45 4 DL CA PCell in TDD FDD-TDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.45.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in TDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.45.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4 and cell 6 are activated SCells on secondary component carriers SCC1, SCC2 and SCC3 respectively. Cell 3, cell 5 and cell 7 are neighbouring cells on secondary component carriers SCC1, SCC2 and SCC3 respectively. The test parameters are given in Table A.9.1.45.2-1.

**Table A.9.1.45.2-1: 4 Downlink PCell in TDD-FDD RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6 | Cell 7 |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | 6 | - | | - | | - | |
| Uplink/downlink configuration[Note1] | | 1 | - | | - | | - | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PDSCH_RA | | | | | | | | | |
| PDSCH_RB | | | | | | | | | |
| OCNG_RA[Note1] | | | | | | | | | |
| OCNG_RB[Note1] | | | | | | | | | |
| $N_{oc}$[Note3] | Bands FDD_A | dBm/15 kHz | - | ($N_{oc}$ for Channel 1 +1dB) | | ($N_{oc}$ for Channel 1 +1dB) | | ($N_{oc}$ for Channel 1 +1dB) | ($N_{oc}$ for Channel 1 +1dB) |
| | Bands FDD_B1, FDD_B2[Note 10] | | | | | | | | |
| | Bands FDD_C | | | | | | | | |
| | Bands FDD_D | | | | | | | | |
| | Bands FDD_E, FDD_F[Note 7] | | | | | | | | |
| | Bands FDD_G | | | | | | | | |
| | Bands FDD_H | | | | | | | | |
| | Bands TDD_A | | -117 | - | | - | | - | |
| | Bands TDD_C | | -116 | | | | | | |
| | Bands TDD_E | | -115 | | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands FDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2[Note 10] | | | | | | | | |
| | Bands FDD_C | | | | | | | | |
| | Bands FDD_D | | | | | | | | |
| | Bands FDD_E, FDD_F[Note 7] | | | | | | | | |
| | Bands FDD_G | | | | | | | | |
| | Bands FDD_H | | | | | | | | |
| | Bands TDD_A | | -121 | - | - | - | - | - | - |
| | Bands TDD_C | | -120 | | | | | | |
| | Bands TDD_E | | -119 | | | | | | |
| Io[Note4] | Bands FDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel4}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2[Note 10] | | | | | | | | |
| | Bands FDD_C | | | | | | | | |
| | Bands FDD_D | | | | | | | | |
| | Bands FDD_E, FDD_F[Note 7] | | | | | | | | |
| | Bands FDD_G | | | | | | | | |
| | Bands FDD_H | | | | | | | | |
| | Bands TDD_A | | -87.76+10log($N_{RB,c}$/50) | - | | - | | - | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1[Note 8] | | | - | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2[Note8] | | | - | - | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 4[Note8] | | | - | - | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.45.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.46 4 DL FDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.46.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in FDD-FDD carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.46.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4 and cell 6 are activated SCells on secondary component carriers SCC1, SCC2 and SCC3 respectively. Cell 3, cell 5 and cell 7 are neighbouring cells on secondary component carriers SCC1, SCC2 and SCC3 respectively. The test parameters are given in Table A.9.1.46.2-1, Table A.9.1.46.2-2 and Table A.9.1.46.2-3.

**Table A.9.1.46.2-1: 4 DL FDD RSRP carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note1] | | | | | |
| OCNG_RB[Note1] | | | | | |
| $N_{oc}$ [Note2] | Bands FDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F [Note 6] | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP[Note3] | Bands FDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F [Note 6] | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| Io[Note3] | Bands FDD_A | dBm/ $BW_{channel}$ | -87.76 +10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -87.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -86.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F [Note 6] | | -85.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |

| | | | | |
|---|---|---|---|---|
| Antenna Configuration | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | - | ≤ TAE | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.46.2-2: 4 DL FDD RSRP carrier aggregation test parameters for cell 4 and cell 5**

| Parameter | | Unit | Cell 4 | Cell 5 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 3 | |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.46.2-3: 4 DL FDD RSRP carrier aggregation test parameters for cell 6 and cell 7**

| Parameter | Unit | Cell 6 | Cell 7 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |

| | | | | |
|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |

| | | | |
|---|---|---|---|
| Time alignment error relative to cell 1[Note 7] | | ≤ TAE | - |
| Time alignment error relative to cell 2[Note 7] | | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 7] | | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.46.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 10 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.47 4 DL TDD RSRP for E-UTRAN in Carrier Aggregation

## A.9.1.47.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in TDD-TDD carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.47.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4 and cell 6 are activated SCells on secondary component carriers SCC1, SCC2 and SCC3 respectively. Cell 3, cell 5 and cell 7 are neighbouring cells on secondary component carriers SCC1, SCC2 and SCC3 respectively. The test parameters are given in Table A.9.1.47.2-1, Table A.9.1.47.2-2 and Table A.9.1.47.2-3.

**Table A.9.1.47.2-1: 4 DL TDD RSRP carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | |
| $BW_{channel}$ | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | | 6 | | |
| Uplink/downlink configuration[Note1] | | | 1 | | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |

| | | | | | |
|---|---|---|---|---|---|
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76 + 10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -85.76 + 10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.47.2-2: 4 DL TDD RSRP carrier aggregation test parameters for cell 4 and cell 5**

| Parameter | Unit | Cell 4 | Cell 5 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note1 | | 6 | |
| Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |

| | | | | |
|---|---|---|---|---|
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.47.2-3: 4 DL TDD RSRP carrier aggregation test parameters for cell 6 and cell 7**

| Parameter | Unit | Cell 6 | Cell 7 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note1 | | 6 | |
| Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD | N/A |

| | | | | |
|---|---|---|---|---|
| | | | 20MHz: R.3 TDD | |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | 0 | 3 |
| Time alignment error relative to cell 1 [Note 7] | | | ≤ TAE | - |
| Time alignment error relative to cell 2 [Note 7] | | | ≤ TAE | |
| Time alignment error relative to cell 4 [Note 7] | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

| | |
|---|---|
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.47.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 10 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.48 5 DL FDD-TDD with PCell in FDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.48.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in FDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.48.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell 6 and cell 8 are activated SCells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. Cell 3, cell 5, cell 7 and cell 9 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. The test parameters are given in Table A.9.1.48.2-1, Table A.9.1.48.2-2 and Table A.9.1.48.2-3.

**Table A.9.1.48.2-1: 5 Downlink PCell in FDD RSRP carrier aggregation test parameters for cell 1, cell 2, cell 3, cell 4 and cell 5**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | | 3 | |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | | - | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | - | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2. | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.7 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA[Note2] | | | | | | | |
| OCNG_RB[Note2] | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | - | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -117 | - | | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -121 | - | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/50) | - | | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Timing offset to cell 1 | μs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.48.2-2: 5 Downlink PCell in FDD RSRP carrier aggregation test parameters for cell 6 and cell 7**

| Parameter | Unit | Cell 6 | Cell 7 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note1 | | 6 | |
| Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |

| | | | | |
|---|---|---|---|---|
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | |
| Time alignment error relative to cell 4 Note 7 | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.48.2-3: 5 Downlink PCell in FDD RSRP carrier aggregation test parameters for cell 8 and cell 9**

| Parameter | Unit | Cell 8 | Cell 9 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 5 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note1 | | 6 | |
| Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |

| | | | | |
|---|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 [Note 7] | | | ≤ TAE | - |
| Time alignment error relative to cell 2 [Note 7] | | | ≤ TAE | |
| Time alignment error relative to cell 4 [Note 7] | | | ≤ TAE | |
| Time alignment error relative to cell 6 [Note 7] | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 4: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.48.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 13 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.49 5 DL FDD-TDD with PCell in TDD RSRP for E-UTRAN in Carrier Aggregation

### A.9.1.49.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in TDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

### A.9.1.49.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell 6 and cell 8 are activated SCells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. Cell 3, cell 5, cell 7 and cell 9 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. The test parameters are given in Table A.9.1.49.2-1, Table A.9.1.49.2-2 and Table A.9.1.49.2-3.

**Table A.9.1.49.2-1: 5 Downlink PCell in TDD RSRP carrier aggregation test parameters for cell 1, cell 2, cell 3, cell 4 and cell 5**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | 6 | - | | - | |
| Uplink/downlink configuration[Note1] | | 1 | - | | - | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2. | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | | | | | | |
| $N_{oc}$ Note3 | Bands FDD_A | dBm/15 kHz | - | ($N_{oc}$ for Channel 1 +1dB) | | ($N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | |
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| | Bands TDD_A | | -117 | - | | - | |
| | Bands TDD_C | | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands FDD_A | dBm/15 kHz | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | |
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| | Bands TDD_A | | -121 | - | - | - | - |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| Io Note4 | Bands FDD_A | dBm/ $BW_{channel}$ | - | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| | Bands TDD_A | | -87.76+10log($N_{RB,c}$/50) | - | - | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | μs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2Note8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.49.2-2: 5 Downlink PCell in TDD RSRP carrier aggregation test parameters for cell 6 and cell 7**

| Parameter | Unit | Cell 6 | Cell 7 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | dB | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 4 Note 7 | | | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

| | |
|---|---|
| Note 5: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 6: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 7: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 9: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

**Table A.9.1.49.2-3: 5 Downlink PCell in TDD RSRP carrier aggregation test parameters for cell 8 and cell 9**

| Parameter | | Unit | Cell 8 | Cell 9 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 5 | |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_B1, FDD_B2 Note 9 | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $Io^{Note3}$ | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 4 Note 7 | | | ≤ TAE | - |
| Time alignment error relative to cell 6 Note 7 | | | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.49.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 13 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.50 5 DL FDD RSRP for E-UTRAN in Carrier Aggregation

## A.9.1.50.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD-FDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in FDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.50.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell6 and cell8 are activated SCells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. Cell 3, cell 5, cell7 and cell9 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. The test parameters are given in Table A.9.1.50.2-1.

**Table A.9.1.50.2-1: 5 DL FDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #1, cell #2 and cell #3)**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36 | 5MHz: 7-17<br>10MHz: 13-36 | - |

| | | | | | |
|---|---|---|---|---|---|
| | | | 20MHz: 38-61 | 20MHz: 38-61 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -87.76 +10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -87.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -86.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | - |

| | | | | |
|---|---|---|---|---|
| Time alignment error relative to cell 2 Note 7 | | - | - | - |
| Time alignment error relative to cell 4 Note 7 | | - | - | - |
| Time alignment error relative to cell 6 Note 7 | | - | - | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.50.2-2: 5 DL FDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #4 – cell #9)**

| Parameter | Unit | Cell 4 | Cell 5 | Cell 6 | Cell 7 | Cell 8 | Cell 9 |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 3 | | 4 | | 5 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.16 FDD<br>10MHz: OP.2 FDD<br>20MHz: OP.12 FDD |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | | | | |
| | Bands FDD_G | | | | | | | |
| | Bands FDD_H | | | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | | | | |
| | Bands FDD_G | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel4}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel5}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | | | | |
| | Bands FDD_G | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_H | | | | | | | |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | 0 | 3 | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1[Note 7] | | | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2[Note 7] | | | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 7] | | | - | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 6[Note 7] | | | - | - | | - | ≤ TAE | - |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.50.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.51 5 DL TDD RSRP for E-UTRAN in Carrier Aggregation

## A.9.1.51.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRP absolute and relative accuracy requirements in carrier aggregation with PCell in TDD are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.51.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell6 and cell8 are activated SCells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. Cell 3, cell 5, cell7 and cell9 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. The test parameters are given in Table A.9.1.51.2-1.

**Table A.9.1.51.2-1: 5 DL TDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #1, cell #2 and cell #3)**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink/downlink configuration[Note1] | | 1 | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76 + 10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -85.76 + 10log($N_{RB,c}$/50) | | |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 3 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.51.2-2: 5 DL TDD RSRP test parameters for E-UTRAN Carrier aggregation (cell #4 – cell #9)**

| Parameter | Unit | Cell 4 | Cell 5 | Cell 6 | Cell 7 | Cell 8 | Cell 9 |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 3 | | 4 | | 5 | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| Special subframe configuration Note1 | | 6 | | | | | |
| Uplink/downlink configuration Note1 | | 1 | | | | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | - | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | - | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD | 5MHz: R.11 TDD 10MHz: R.6 TDD 20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD | 5MHz: OP.9 TDD 10MHz: OP.1 TDD 20MHz: OP.7 TDD | 5MHz: OP.10 TDD 10MHz: OP.2 TDD 20MHz: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | | | |
| | Bands TDD_E | | | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | (RSRP1 +8dB for Cell) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | | | |
| | Bands TDD_E | | | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel4}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel5}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | | | |
| | Bands TDD_E | | | | | | | |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1[Note 7] | | | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2[Note 7] | | | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 4[Note 7] | | | - | - | ≤ TAE | - | ≤ TAE | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time alignment error relative to cell 6[Note 7] | | - | - | | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.51.3 Test Requirements

In the test, the performance of RSRP measurements is verified form following perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.52 FD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeA

## A.9.1.52.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 and 9.1.21.2 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

## A.9.1.52.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.52.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.52.2-1: FD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.20 FDD | - | R.20 FDD | - | R.20 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.20 FDD | - | Follows R.20 FDD | - | Follows R.20 FDD | - |
| MPDCCH Reference measurement channel | | | R.16 FDD | | R.16 FDD | | R.16 FDD | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-M1_B Note 6 | | | | | | -115.5 | |
| | Bands FDD-M1_C | | | | | | -115 | |
| | Bands FDD-M1_D | | | | | | -114.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -114 | |
| | Bands FDD-M1_G | | | | | | -113 | |
| | Bands FDD-M1_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-M1_B Note 6 | | | | | | -112.5 | -116.5 |
| | Bands FDD-M1_C | | | | | | -112 | -116 |
| | Bands FDD-M1_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -111 | -115 |
| | Bands FDD-M1_G | | | | | | -110 | -114 |
| | Bands FDD-M1_H | | | | | | -109.5 | -113.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD-M1_B Note 6 | | | | | | -81.93 | |
| | Bands FDD-M1_C | | | | | | -81.43 | |
| | Bands FDD-M1_D | | | | | | -80.93 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -80.43 | |
| | Bands FDD-M1_G | | | | | | -79.43 | |
| | Bands FDD-M1_H | | | | | | -78.93 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.52.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

## A.9.1.52A FD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeA

### A.9.1.52A.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 and 9.1.21.2 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.52A.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.52A.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.52A.2-1: FD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeA**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel | | R.28 FDD | - | R.28 FDD | - | R.28 FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.28 FDD | - | Follows R.28 FDD | - | Follows R.28 FDD | - |
| MPDCCH Reference measurement channel | | R.24 FDD | | R.24 FDD | | R.24 FDD | |
| OCNG Patterns | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note1] | | | | | | | | |
| OCNG_RB[Note1] | | | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD-M1_N | dBm/15 kHz | -103 | | -83 | | -109.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | 2.46 | -5.97 | 2.46 | -5.97 | 0.46 | -5.76 |
| RSRP[Note3] | Bands FDD-M1_N | dBm/15 kHz | -97 | -102 | -77 | -82 | -106.5 | -110.5 |
| Io[Note3] | Bands FDD-M1_N | dBm/4.5 MHz | -70.28 | | -50.28 | | -78.94 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.52A.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

## A.9.1.53 HD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeA

### A.9.1.53.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 and 9.1.21.2 for HD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.53.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.53.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.53.2-1: HD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | R.10 HD-FDD | - | R.10 HD-FDD | - | R.10 HD-FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.10 HD-FDD | - | Follows R.10 HD-FDD | - | Follows R.10 HD-FDD | - |

| MPDCCH Reference measurement channel | | | R.6 HD-FDD | | R.6 HD-FDD | | R.6 HD-FDD | |
|---|---|---|---|---|---|---|---|---|
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-M1_B | | | | | | -115.5 | |
| | Bands FDD-M1_C | | | | | | -115 | |
| | Bands FDD-M1_D | | | | | | -114.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -114 | |
| | Bands FDD-M1_G | | | | | | -113 | |
| | Bands FDD-M1_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-M1_B | | | | | | -112.5 | -116.5 |
| | Bands FDD-M1_C | | | | | | -112 | -116 |
| | Bands FDD-M1_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -111 | -115 |
| | Bands FDD-M1_G | | | | | | -110 | -114 |
| | Bands FDD-M1_H | | | | | | -109.5 | -113.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands FDD-M1_B | | | | | | -81.93 | |
| | Bands FDD-M1_C | | | | | | -81.43 | |
| | Bands FDD-M1_D | | | | | | -80.93 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -80.43 | |
| | Bands FDD-M1_G | | | | | | -79.43 | |
| | Bands FDD-M1_H | | | | | | -78.93 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.53.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

# A.9.1.53A HD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeA

## A.9.1.53A.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 and 9.1.21.2 for HD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

## A.9.1.53A.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.53A.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.53A.2-1: HD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel | | | R.18 HD-FDD | - | R.18 HD-FDD | - | R.18 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.18 HD-FDD | - | Follows R.18 HD-FDD | - | Follows R.18 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.14 HD-FDD | | R.14 HD-FDD | | R.14 HD-FDD | |
| OCNG Patterns | | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note1] | | | | | | | | |
| OCNG_RB[Note1] | | | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD-M1_N | dBm/15 kHz | -103 | | -83 | | -109.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | 2.46 | -5.97 | 2.46 | -5.97 | 0.46 | -5.76 |
| RSRP[Note3] | Bands FDD-M1_N | dBm/15 kHz | -97 | -102 | -77 | -82 | -106.5 | -110.5 |
| Io[Note3] | Bands FDD-M1_N | dBm/4.5 MHz | -70.28 | | -50.27 | | -78.94 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 3: | Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 5: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.53A.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

## A.9.1.54 TDD RSRP Intra frequency case for Cat-M1 UE in CEModeA

### A.9.1.54.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 and 9.1.21.2 for TDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.54.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.54.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.54.2-1: TDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.16 TDD | - | R.16 TDD | - | R.16 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.16 TDD | - | Follows R.16 TDD | - | Follows R.16 TDD | - |
| MPDCCH Reference measurement channel | | | R.14 TDD | | R.14 TDD | | R.14 TDD | |
| OCNG Patterns | | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands TDD-M1_C | | | | | | -115 | |
| | Bands TDD-M1_E | | | | | | -114 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.5 | -5.76 |
| RSRP[Note4] | Bands TDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands TDD-M1_C | | | | | | -112 | -116 |
| | Bands TDD-M1_E | | | | | | -111 | -115 |
| Io[Note4] | Bands TDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands TDD-M1_C | | | | | | -81.43 | |
| | Bands TDD-M1_E | | | | | | -80.43 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | µs | - | 3 | - | 3 | - | 3 |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.54.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

## A.9.1.55 FS3 Intra frequency absolute and relative RSRP accuracies with FDD PCell

### A.9.1.55.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD intra frequency RSRP absolute and relative measurement accuracies in carrier aggregation with frame structure 3 in the configured DMTC occasion are within the specified limits. This test will verify the absolute RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.19.2, and the relative RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.19.2. The test will also verify the primary and secondary component carrier relative RSRP accuracy requirement defined in Clause 9.1.19.4.

### A.9.1.55.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier with frame structure 3 and activated, and Cell3 is the neighboring cell on the same secondary component carrier of Cell2. The test parameters are given in Table A.9.1.55.2-1. The DMTC configuration for Cell2 and Cell3 is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.55.2-1: Test parameters for FDD RSRP accuracies of Scell with FS3**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 20 | 20 |
| DMTC period | ms | N/A | 40 | 40 |

| | | | | | |
|---|---|---|---|---|---|
| DMTC period offset | | | N/A | 10 | 10 |
| Discovery signal occasion duration | | ms | N/A | 1 | 1 |
| LBT model | | | N/A | N/A | [A.3.17] |
| Timing offset to cell1 | | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 47-52 | 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 and A.3.1.1.6(R.0 FS3) | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | R.0 FS3 | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FS3_G | | - | ( $N_{oc}$ for Channel 1 +1dB) | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 Note9 | -5.76 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -121 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| | Bands FS3_G | | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| Io Note3 | Bands FDD_A | 5MHz: dBm/4.5MHz<br>10MHz: dBm/9MHz<br>20MHz: dBm/18MHz | -87.76 +10log($N_{RB,c}$/50) | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -86.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -86.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | |
| | Bands FS3_G | | - | (Io for Channel 1 +5.33dB Note9 +10log($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | (Io for Channel 1 +5.33dB +10log($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: The value is corresponding to DRS transmission through LBT operation in Cell3.

| Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |
|---|

### A.9.1.55.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 3 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2
- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.19.4.

## A.9.1.56 FS3 Intra frequency absolute and relative RSRP accuracies with TDD PCell

### A.9.1.56.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD intra frequency RSRP absolute and relative measurement accuracies in carrier aggregation with frame structure 3 in the configured DMTC occasion are within the specified limits. This test will verify the absolute RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.19.2, and the relative RSRP accuracy requirement of the secondary component carrier defined in clause 9.1.19.2. The test will also verify the primary and secondary component carrier relative RSRP accuracy requirement defined in Clause 9.1.19.4.

### A.9.1.56.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier with frame structure 3 and activated, and Cell3 is the neighboring cell on the same secondary component carrier of Cell2. The test parameters are given in Table A.9.1.56.2-1. The DMTC configuration for Cell2 and Cell3 is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.1.56.2-1: Test parameters for TDD RSRP accuracies of Scell with FS3**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 20 | 20 |
| DMTC period | ms | N/A | 40 | 40 |
| DMTC period offset | | N/A | 10 | 10 |
| Discovery signal occasion duration | ms | N/A | 1 | 1 |
| LBT model | | N/A | N/A | A.3.17 |
| Special subframe configuration[Note1] | | 6 | N/A | N/A |
| Uplink/downlink configuration[Note1] | | 1 | N/A | N/A |
| Timing offset to cell1 | μs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |

| | | | | | |
|---|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 47-52 | 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | R.0 FS3 | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -117 | - | |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| | Bands FS3_G | | - | ($N_{oc}$ for Channel 1 +1dB) | |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 Note9 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -121 | - | |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| | Bands FS3_G | | - | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| Io Note4 | Bands TDD_A | 5MHz: dBm/4.5MHz<br>10MHz: dBm/9MHz<br>20MHz: dBm/18MHz | -87.76 +10log($N_{RB,c}$/50) | - | |
| | Bands TDD_C | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -85.76 +10log($N_{RB,c}$/50) | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FS3_G | | - | (Io for Channel 1 +5.33dB[Note9] +10log($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | (Io for Channel 1 +5.33dB +10log($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: The value is corresponding to DRS transmission through LBT operation in Cell3.

### A.9.1.56.3 Test Requirements

In the test, the performance of RSRP measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 3 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2

- The relative accuracy of inter-frequency RSRP measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.19.4.

## A.9.1.57 FD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.57.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 and 9.1.21.4 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.57.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.57.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.57.2-1: FD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH Reference measurement channel | | | R.22 FDD | - | R.22 FDD | - | R.22 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.22 FDD | - | Follows R.22 FDD | - | Follows R.22 FDD | - |
| MPDCCH Reference measurement channel | | | R.18 FDD | | R.18 FDD | | R.18 FDD | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| b $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | |
| | Bands FDD-M1_B Note 6 | | | | | | -106.5 | |
| | Bands FDD-M1_C | | | | | | -106 | |
| | Bands FDD-M1_D | | | | | | -105.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -105 | |
| | Bands FDD-M1_G | | | | | | -104 | |
| | Bands FDD-M1_H | | | | | | -103.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 |
| | Bands FDD-M1_B Note 6 | | | | | | -118.5 | -120.5 |
| | Bands FDD-M1_C | | | | | | -118 | -120 |
| | Bands FDD-M1_D | | | | | | -117.5 | -119.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -117 | -119 |
| | Bands FDD-M1_G | | | | | | -116 | -118 |
| | Bands FDD-M1_H | | | | | | -115.5 | -117.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | |
| | Bands FDD-M1_B Note 6 | | | | | | -78.29 | |
| | Bands FDD-M1_C | | | | | | -77.79 | |
| | Bands FDD-M1_D | | | | | | -77.29 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -76.79 | |
| | Bands FDD-M1_G | | | | | | -75.79 | |
| | Bands FDD-M1_H | | | | | | -75.29 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.57.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3 and 9.1.21.4.

## A.9.1.57A FD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeB

### A.9.1.57A.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 and 9.1.21.4 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.57A.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.57A.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.57A.2-1: FD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeB**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel | | | R.30 FDD | - | R.30 FDD | - | R.30 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.30 FDD | - | Follows R.30 FDD | - | Follows R.30 FDD | - |
| MPDCCH Reference measurement channel | | | R.26 FDD | | R.26 FDD | | R.26 FDD | |
| OCNG Patterns | | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note1] | | | | | | | | |
| OCNG_RB[Note1] | | | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD-M1_N | dBm/15 kHz | -96 | | -79 | | -97.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP[Note3] | Bands FDD-M1_N | dBm/15 kHz | -108 | -110 | -88 | -90 | -112.5 | -114.5 |
| Io[Note3] | Bands FDD-M1_N | dBm/4.5 MHz | -70.80 | | -50.80 | | -72.30 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 5: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.1.57A.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3 and 9.1.21.4.

## A.9.1.58 HD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.58.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 and 9.1.21.4 for HD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.58.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.58.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.58.2-1: HD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.12 HD-FDD | - | R.12 HD-FDD | - | R.12 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.12 HD-FDD | - | Follows R.12 HD-FDD | - | Follows R.12 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.8 HD-FDD | | R.8 HD-FDD | | R.8 HD-FDD | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | |
| | Bands FDD-M1_B | | | | | | -106.5 | |
| | Bands FDD-M1_C | | | | | | -106 | |
| | Bands FDD-M1_D | | | | | | -105.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -105 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD-M1_G | | | | | | -104 | |
| | Bands FDD-M1_H | | | | | | -103.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 |
| | Bands FDD-M1_B | | | | | | -118.5 | -120.5 |
| | Bands FDD-M1_C | | | | | | -118 | -120 |
| | Bands FDD-M1_D | | | | | | -117.5 | -119.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -117 | -119 |
| | Bands FDD-M1_G | | | | | | -116 | -118 |
| | Bands FDD-M1_H | | | | | | -115.5 | -117.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | |
| | Bands FDD-M1_B | | | | | | -78.29 | |
| | Bands FDD-M1_C | | | | | | -77.79 | |
| | Bands FDD-M1_D | | | | | | -77.29 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -76.79 | |
| | Bands FDD-M1_G | | | | | | -75.79 | |
| | Bands FDD-M1_H | | | | | | -75.29 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.58.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3 and 9.1.21.4.

## A.9.1.58A HD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeB

### A.9.1.58A.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 and 9.1.21.4 for HD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.58A.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.58A.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.58.2-1: HD-FDD RSRP Intra frequency case for Cat-M1 UE for 5MHz Bandwidth in CEModeB**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH Reference measurement channel | | | R.20 HD-FDD | - | R.20 HD-FDD | - | R.20 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.20 HD-FDD | - | Follows R.20 HD-FDD | - | Follows R.20 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.16 HD-FDD | | R.16 HD-FDD | | R.16 HD-FDD | |
| OCNG Patterns | | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD-M1_N | dBm/15 kHz | -96 | | -79 | | -97.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -14 | -12 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | -12.17 | -12.17 | -14.27 | -12.17 | -12.17 | -14.27 |
| RSRP[Note3] | Bands FDD-M1_N | dBm/15 kHz | -108 | -110 | -88 | -108 | -110 | -88 |
| Io[Note3] | Bands FDD-M1_N | dBm/4.5 MHz | -70.80 | | -50.80 | | -72.30 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.58A.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3 and 9.1.21.4.

## A.9.1.59 TDD RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.59.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 and 9.1.21.4 for TDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.59.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.59.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.59.2-1: TDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration Note1 | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration Note1 | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.18 TDD | - | R.18 TDD | - | R.18 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.18 TDD | - | Follows R.18 TDD | - | Follows R.18 TDD | - |
| MPDCCH Reference measurement channel | | | R.16 TDD | | R.16 TDD | | R.16 TDD | |
| OCNG Patterns | | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note2 | | | | | | | | |
| OCNG_RB Note2 | | | | | | | | |
| $N_{oc}$ Note3 | Bands TDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | |
| | Bands TDD-M1_C | | | | | | -106 | |
| | Bands TDD-M1_E | | | | | | -105 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ Note4 | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP Note4 | Bands TDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 |
| | Bands TDD-M1_C | | | | | | -118 | -120 |
| | Bands TDD-M1_E | | | | | | -117 | -119 |
| Io Note4 | Bands TDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | |
| | Bands TDD-M1_C | | | | | | -77.79 | |
| | Bands TDD-M1_E | | | | | | -76.79 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.59.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3 and 9.1.21.4.

## A.9.1.60 FS3 Absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal with FDD PCell

### A.9.1.60.1 Test Purpose and Environment

The purpose of this test is to verify that CSI- RSRP measurement accuracy is within the specified limits. This test will verify the absolute intra-frequency CSI-RSRP accuracy requirements of the SCells defined in Section 9.1.18.4.4 for intra-frequency measurements under FS3, and the relative intra-frequency CSI-RSRP accuracy requirements between SCells defined in Section 9.1.18.4.5.

### A.9.1.60.2 Test parameters

In this set of cases Cell 1 is PCell on the primary component carrier, Cell 2 using FS3 is SCell on the secondary component carrier and activated, and Cell 3 using FS3 is the neighbouring cell on the secondary component carrier. The test parameters are given in Table A.9.1.60.2-1. Intra-frequency measurements are supported by a DMTC configuration.

**A.9.1.60.2-1: CSI-RSRP carrier aggregation test parameters with FDD PCell and FS3 SCells**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| Frame structure | | FDD | FS3 | FS3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5 MHz: $N_{RB,c}$ = 25<br>10 MHz: $N_{RB,c}$ = 50<br>20 MHz: $N_{RB,c}$ = 100 | 20 MHz: $N_{RB,c}$ = 100 | 20 MHz: $N_{RB,c}$ = 100 |
| Timing offset to Cell 1 | µs | - | 0 | 3 |
| Uplink/downlink configuration | | - | Note10 | Note10 |
| Time alignment error relative to cell 1 Note 11 | | - | ≤ TAE | - |
| DMTC period | ms | - | 40 | 40 |
| DMTC period offset | ms | - | 10 | 10 |
| Discovery signal occasion duration | ms | - | 1 | 1 |
| CSI-RS resource configuration | | - | 1 | 6 |
| CSI-RS subframe offset | ms | - | 0 | 0 |
| CSI-RS individual offset[2] | dB | - | 0 | 0 |
| LBT model | | - | - | A.3.17 |
| Measurement bandwidth | $n_{PRB}$ | 5 MHz: 10—15<br>10 MHz: 22—27<br>20 MHz: 47—52 | 47—52 | 47—52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5 MHz: R.5 FDD<br>10 MHz: R.0 FDD<br>20 MHz: R.4 FDD | R.0 FS3 | - |
| PDSCH allocation | $n_{PRB}$ | 5 MHz: 7-17<br>10 MHz: 13-36<br>20 MHz: 38-61 | 38—61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5 MHz: R.11 FDD<br>10 MHz: R.6 FDD<br>20 MHz: R.10 FDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2 | | 5 MHz: OP.15 FDD<br>10 MHz: OP.1 FDD<br>20 MHz: OP.11 FDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RANote1 | | | | | |
| OCNG_RBNote | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -117 | - | - |
| | Bands FDD_B1, FDD_B2 Note 12 | | -116.5 | | |
| | Bands FDD_C | | -116 | | |
| | Bands FDD_D | | -115.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -115 | | |
| | Bands FDD_G | | -114 | | |
| | Bands FDD_H | | -113.5 | | |
| | Bands FS3_G | | - | ( $N_{oc}$ for Channel 1 + 1 dB) | |
| CRS $\hat{E}_s/I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s/I_{ot}$ Note3 | | dB | - | 6.46 | 0.24 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -121 | - | - |
| | Bands FDD_B1, FDD_B2 Note 12 | | -120.5 | | |
| | Bands FDD_C | | -120 | | |
| | Bands FDD_D | | -119.5 | | |
| | Bands FDD_E, FDD_F Note 6 | | -119 | | |
| | Bands FDD_G | | -118 | | |
| | Bands FDD_H | | -117.5 | | |
| | Bands FS3_G | | - | RSRP for Cell 1 + 8 dB) | RSRP for Cell 1 + 4 dB) |
| CSI-RSRP Note3 | Bands FS3_G | dBm/15 kHz | - | RSRP for Cell 2 + 6 dB) | RSRP for Cell 3 + 6 dB) |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_B1, FDD_B2 Note 12 | | -87.26+10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F Note 6 | | -85.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | |
| | Bands FS3_G | | - | (Io for Channel 1 + 5.33 dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| CRS $\hat{E}_s/N_{oc}$ | | dB | -4 | 3 | -1 |
| CSI-RS $\hat{E}_s/N_{oc}$ | | dB | - | 9 | 5 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: CSI-RS Es/Iot, RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe.

| | |
|---|---|
| Note 4: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 6: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 7: | Void |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 9: | DMTC configurations are provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test. |
| Note 10: | Downlink only configuration. |
| Note 11: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 12: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.60.3 Test Requirements

In the test, the performance of CSI-RSRP measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.4.

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 3 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.4.

- The relative accuracy of intra-frequency CSI-RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.5.

## A.9.1.61 FS3 Absolute and relative CSI-RSRP accuracies in CSI-RS based discovery signal with TDD PCell

### A.9.1.61.1 Test Purpose and Environment

The purpose of this test is to verify that CSI- RSRP measurement accuracy is within the specified limits. This test will verify the absolute intra-frequency CSI-RSRP accuracy requirements of the SCells defined in Section 9.1.18.4.4 for intra-frequency measurements under FS3, and the relative intra-frequency CSI-RSRP accuracy requirements between SCells defined in Section 9.1.18.4.5.

### A.9.1.61.2 Test parameters

In this set of cases Cell 1 is PCell on the primary component carrier, Cell 2 using FS3 is SCell on the secondary component carrier and activated, and Cell 3 using FS3 is the neighboring cell on the secondary component carrier. The test parameters are given in Table A.9.1.61.2-1. The intra-frequency measurements are supported by a DMTC configuration.

**A.9.1.61.2-1: CSI-RSRP carrier aggregation test parameters with TDD PCell and FS3 SCells**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | **Cell 1** | **Cell 2** | **Cell3** |
| Frame structure | | TDD | FS3 | FS3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 20 MHz: $N_{RB,c}$ = 100 | 20 MHz: $N_{RB,c}$ = 100 |
| Timing offset to cell1 | μs | - | 0 | 3 |
| Special subframe configuration[Note1] | | 6 | Note10 | Note10 |
| Uplink/downlink configuration[Note1] | | 1 | Note10 | Note10 |
| Time alignment error relative to cell 1 [Note 11] | | - | ≤ TAE | - |
| DMTC period | ms | - | 40 | 40 |

| | | | | | |
|---|---|---|---|---|---|
| DMTC period offset | | ms | - | 10 | 10 |
| Discovery signal occasion duration | | ms | - | 1 | 1 |
| CSI-RS resource configuration | | | - | 1 | 6 |
| CSI-RS subframe offset | | ms | - | 0 | 0 |
| CSI-RS individual offset[2] | | dB | - | 0 | 0 |
| LBT model | | | - | - | A.3.17 |
| Measurement bandwidth | | $n_{PRB}$ | 5 MHz: 10—15<br>10 MHz: 22—27<br>20 MHz: 47—52 | 47—52 | 47—52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5 MHz: R.4 TDD<br>10 MHz: R.0 TDD<br>20 MHz: R.3 TDD | R.0 FS3 | - |
| PDSCH allocation | | $n_{PRB}$ | 5 MHz: 7-17<br>10 MHz: 13-36<br>20 MHz: 38-61 | 38—61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5 MHz: R.11 TDD<br>10 MHz: R.6 TDD<br>20 MHz: R.10 TDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2.2 | | | 5 MHz: OP.9 TDD<br>10 MHz: OP.1 TDD<br>20 MHz: OP.7 TDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RANote1 | | | | | |
| OCNG_RBNote | | | | | |
| $N_{oc}$ Note2 | Bands TDD_A | dBm/15 kHz | -117 | - | - |
| | Bands TDD_C | | -116 | | |
| | Bands TDD_E | | -115 | | |
| | Bands FS3_G | | - | ( $N_{oc}$ for Channel 1 + 1 dB) | |
| CRS $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 |
| CSI-RS $\hat{E}_s / I_{ot}$ Note3 | | dB | - | 6.46 | 0.24 |
| RSRP Note3 | Bands TDD_A | dBm/15 kHz | -121 | - | - |
| | Bands TDD_C | | -120 | | |
| | Bands TDD_E | | -119 | | |
| | Bands FS3_G | | - | RSRP for Cell 1 + 8 dB) | RSRP for Cell 1 + 4 dB) |
| CSI-RSRP Note3 | Bands FS3_G | dBm/15 kHz | - | RSRP for Cell 2 + 6 dB) | RSRP for Cell 3 + 6 dB) |
| Io Note3 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/50) | - | - |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | |
| | Bands FS3_G | | - | (Io for Channel 1 + 5.33 dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 |
| CSI-RS $\hat{E}_s / N_{oc}$ | | dB | - | 9 | 5 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | CSI-RS Es/Iot, RSRP, CSI-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement subframe. |
| Note 4: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 6: | Void |
| Note 7: | Void |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 9: | DMTC configurations are provided to the UE in the *measDS-Config* (in TS36.331) before the beginning of the test. |
| Note 10: | Downlink only configuration. |
| Note 11: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |

### A.9.1.61.3 Test Requirements

In the test, the performance of CSI-RSRP measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.4.

- The absolute accuracy of intra-frequency CSI-RSRP measurements for Cell 3 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.4.

- The relative accuracy of intra-frequency CSI-RSRP measurements for Cell 3 relative to Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.18.4.5.

## A.9.1.62 FD-FDD RSRP Inter frequency case for Cat-M1 UE in CEModeA

### A.9.1.62.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.9 and 9.1.21.10 for FD-FDD inter frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.62.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.62.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.62.2-1: FD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | - | 0 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | R.20 FDD | - | R.20 FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.20 FDD | - | Follows R.20 FDD | - |
| MPDCCH Reference measurement channel | | R.16 FDD | R.16 FDD | R.16 FDD | R.16 FDD |
| OCNG Patterns | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note1 | | | | | | |
| OCNG_RB Note1 | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -88.65 | -88.65 | ($N_{oc}$ for Channel 2 +8dB) | -116 |
| | Bands FDD-M1_B | | | | | -115.5 |
| | Bands FDD-M1_C | | | | | -115 |
| | Bands FDD-M1_D | | | | | -114.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -114 |
| | Bands FDD-M1_G | | | | | -113 |
| | Bands FDD-M1_H | | | | | -112.5 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -120 |
| | Bands FDD-M1_B | | | | | -119.5 |
| | Bands FDD-M1_C | | | | | -119 |
| | Bands FDD-M1_D | | | | | -118.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -118 |
| | Bands FDD-M1_G | | | | | -117 |
| | Bands FDD-M1_H | | | | | -116.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 +19.75dB) | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.62.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.9 and 9.1.21.10.

## A.9.1.63 HD-FDD RSRP Inter frequency case for Cat-M1 UE in CEModeA

### A.9.1.53.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in section 9.1.21.9 and 9.1.21.10 for HD-FDD inter frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.53.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.63.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.63.2-1: HD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | R.10 HD-FDD | - | R.10 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.10 HD-FDD | - | Follows R.10 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.6 HD-FDD | R.6 HD-FDD | R.6 HD-FDD | R.6 HD-FDD |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note1 | | | | | | |
| OCNG_RB Note1 | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -88.65 | -88.65 | ($N_{oc}$ for Channel 2 +8dB) | -116 |
| | Bands FDD-M1_B | | | | | -115.5 |
| | Bands FDD-M1_C | | | | | -115 |
| | Bands FDD-M1_D | | | | | -114.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -114 |
| | Bands FDD-M1_G | | | | | -113 |
| | Bands FDD-M1_H | | | | | -112.5 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -120 |
| | Bands FDD-M1_B | | | | | -119.5 |
| | Bands FDD-M1_C | | | | | -119 |
| | Bands FDD-M1_D | | | | | -118.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -118 |
| | Bands FDD-M1_G | | | | | -117 |
| | Bands FDD-M1_H | | | | | -116.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 +19.75dB) | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 10 | 10 | 13 | -4 |
| Propagation condition | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | |
| Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. | | | | | |
| Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz. | | | | | |
| Note 5: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

### A.9.1.63.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1 and 9.1.21.2.

## A.9.1.64 TDD RSRP Inter frequency case for Cat-M1 UE in CEModeA

### A.9.1.64.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.9 and 9.1.21.10 for TDD inter frequency RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.64.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.64.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.1.64.2-1: TDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | - | 0 | - |
| Special subframe configuration | | 6 | 6 | 6 | 6 |
| Uplink/downlink configuration | | 1 | 1 | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | R.16 TDD | - | R.16 TDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.16 TDD | - | Follows R.16 TDD | - |
| MPDCCH Reference measurement channel | | R.14 TDD | R.14 TDD | R.14 TDD | R.14 TDD |
| OCNG Patterns | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| OCNG_RA[Note1] | | | | | | |
| OCNG_RB[Note1] | | | | | | |
| $N_{oc}$ [Note2] | Bands TDD-M1_A | dBm/15 kHz | -88.65 | -88.65 | ($N_{oc}$ for Channel 2 +8dB) | -116 |
| | Bands TDD-M1_C | | | | | -115 |
| | Bands TDD-M1_E | | | | | -114 |
| $\hat{E}_s / I_{ot}$ | | dB | 10 | 10 | 13 | -4 |
| RSRP[Note3] | Bands TDD-M1_A | dBm/15 kHz | -78.65 | -78.65 | (RSRP for Cell 2 +25dB) | -120 |
| | Bands TDD-M1_C | | | | | -119 |
| | Bands TDD-M1_E | | | | | -118 |
| Io[Note3] | Bands TDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | (Io for Channel 2 +19.75dB) | -86.76 |
| | Bands TDD-M1_C | | | | | -85.76 |
| | Bands TDD-M1_E | | | | | -84.76 |
| $\hat{E}_s / N_{oc}$ | | dB | 10 | 10 | 13 | -4 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.64.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.9 and 9.1.21.10.

## A.9.1.65 FD-FDD RSRP Inter frequency case for Cat-M1 UE in CEModeB

### A.9.1.65.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.11 and 9.1.21.12 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.65.2 Test parameters

Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.65.2-1 and A.9.1.65.2-2. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.65.2-1: FD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeB for 10MHz cell BW**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | - | 0 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | R.22 FDD | - | R.22 FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.22 FDD | - | Follows R.22 FDD | - |
| MPDCCH Reference measurement channel | | R.18 FDD | R.18 FDD | R.18 FDD | R.18 FDD |

| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
|---|---|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD-M1_A | dBm/15 kHz | -78.5 | -78.5 | -98.5 | -108 |
| | Bands FDD-M1_B | | | | | -107.5 |
| | Bands FDD-M1_C | | | | | -107 |
| | Bands FDD-M1_D | | | | | -106.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -106 |
| | Bands FDD-M1_G | | | | | -105 |
| | Bands FDD-M1_H | | | | | -104.5 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 | -12 |
| RSRP[Note3] | Bands FDD-M1_A | dBm/15 kHz | -90.5 | -90.5 | -110.5 | -120 |
| | Bands FDD-M1_B | | | | | -119.5 |
| | Bands FDD-M1_C | | | | | -119 |
| | Bands FDD-M1_D | | | | | -118.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -118 |
| | Bands FDD-M1_G | | | | | -117 |
| | Bands FDD-M1_H | | | | | -116.5 |
| Io[Note3] | Bands FDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | -70.45 | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 | -12 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.65.2-2: FD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeB for 5MHz cell BW**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 5 | 5 | 5 | 5 |
| Gap Pattern Id | | 0 | - | 0 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | R.30 FDD | - | R.30 FDD z | - |
| PDSCH allocation | | $n_{PRB}$ | Follow R.30 FDD | - | Follow R.30 FDD | - |
| MPDCCH Reference measurement channel | | | R.26 FDD | R.26 FDD | R.26 FDD | R.26 FDD |
| OCNG Patterns | | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note1] | | | | | | |
| OCNG_RB[Note1] | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD-M1_A | dBm/15 kHz | -75.5 | -75.5 | -95.5 | -105 |
| | Bands FDD-M1_B | | | | | -104.5 |
| | Bands FDD-M1_C | | | | | -104 |
| | Bands FDD-M1_D | | | | | -103.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -103 |
| | Bands FDD-M1_G | | | | | -102 |
| | Bands FDD-M1_H | | | | | -101.5 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 | -12 |
| RSRP[Note3] | Bands FDD-M1_A | dBm/15 kHz | -87.5 | -87.5 | -107.5 | -117 |
| | Bands FDD-M1_B | | | | | -116.5 |
| | Bands FDD-M1_C | | | | | -116 |
| | Bands FDD-M1_D | | | | | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -115 |
| | Bands FDD-M1_G | | | | | -114 |
| | Bands FDD-M1_H | | | | | -113.5 |
| Io[Note3] | Bands FDD-M1_A | dBm/4.5 MHz | -50.45 | -50.45 | -70.45 | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 | -12 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.65.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.11 and 9.1.21.12.

## A.9.1.66 HD-FDD RSRP Inter frequency case for Cat-M1 UE in CEModeB

### A.9.1.66.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.11 and 9.1.21.12 for HD-FDD inter frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.66.2 Test parameters

Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.66.2-1 and A.9.1.66.2-2. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.66.2-1: HD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeB for 10Mhz Cell BW**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | R.12 HD-FDD | - | R.12 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.12 HD-FDD | - | Follows R.12 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.8 HD-FDD D | R.8 HD-FDD | R.8 HD-FDD | R.8 HD-FDD |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note1 | | | | | | |
| OCNG_RB Note1 | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -78.5 | -78.5 | -98.5 | -108 |
| | Bands FDD-M1_B | | | | | -107.5 |
| | Bands FDD-M1_C | | | | | -107 |
| | Bands FDD-M1_D | | | | | -106.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -106 |
| | Bands FDD-M1_G | | | | | -105 |
| | Bands FDD-M1_H | | | | | -104.5 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 | -12 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -90.5 | -90.5 | -110.5 | -120 |
| | Bands FDD-M1_B | | | | | -119.5 |
| | Bands FDD-M1_C | | | | | -119 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD-M1_D | | | | | -118.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -118 |
| | Bands FDD-M1_G | | | | | -117 |
| | Bands FDD-M1_H | | | | | -116.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | -70.45 | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 | -12 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.1.66.2-2: HD-FDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeB for 5MHz Cell BW**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 5 | 5 | 5 | 5 |
| Gap Pattern Id | | | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | R.13 HD-FDD | - | R.13 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.13 HD-FDD | - | Follows R.13 HD-FDD | - |
| MPDCCH Reference measurement channel | | | R.9 HD-FDD D | R.9 HD-FDD | R.9 HD-FDD | R.9 HD-FDD |
| OCNG Patterns | | | OP.22 FDD | OP.19 FDD | OP.22 FDD | OP.19 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note1 | | | | | | |
| OCNG_RB Note1 | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -75.5 | -75.5 | -95.5 | -105 |
| | Bands FDD-M1_B | | | | | -104.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD-M1_C | | | | | -104 |
| | Bands FDD-M1_D | | | | | -103.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -103 |
| | Bands FDD-M1_G | | | | | -102 |
| | Bands FDD-M1_H | | | | | -101.5 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | -12 | -12 | -12 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -87.5 | -87.5 | -107.5 | -117 |
| | Bands FDD-M1_B | | | | | -116.5 |
| | Bands FDD-M1_C | | | | | -116 |
| | Bands FDD-M1_D | | | | | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -115 |
| | Bands FDD-M1_G | | | | | -114 |
| | Bands FDD-M1_H | | | | | -113.5 |
| Io Note3 | Bands FDD-M1_A | dBm/4.5 MHz | -50.45 | -50.45 | -70.45 | -86.76 |
| | Bands FDD-M1_B | | | | | -86.26 |
| | Bands FDD-M1_C | | | | | -85.76 |
| | Bands FDD-M1_D | | | | | -85.26 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | -84.76 |
| | Bands FDD-M1_G | | | | | -83.76 |
| | Bands FDD-M1_H | | | | | -83.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 | -12 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.66.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.11 and 9.1.21.12.

## A.9.1.67 TDD RSRP Inter frequency case for Cat-M1 UE in CEModeB

### A.9.1.67.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.11 and 9.1.21.12 for TDD inter frequency RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.67.2 Test parameters

Both absolute and relative accuracy of RSRP inter frequency measurements are tested by using the parameters in Table A.9.1.67.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

**Table A.9.1.67.2-1: TDD RSRP Inter frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | - | 0 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Special subframe configuration | | | 6 | 6 | 6 | 6 |
| Uplink/downlink configuration | | | 1 | 1 | 1 | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | R.18 TDD | - | R.18 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.18 TDD | - | Follows R.18 TDD | - |
| MPDCCH Reference measurement channel | | | R.16 TDD | R.16 TDD | R.16 TDD | R.16 TDD |
| OCNG Patterns | | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| MPDCCH_RA | | | | | | |
| MPDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note1] | | | | | | |
| OCNG_RB[Note1] | | | | | | |
| $N_{oc}$ [Note2] | Bands TDD-M1_A | dBm/15 kHz | -78.5 | -78.5 | -98.5 | -108 |
| | Bands TDD-M1_C | | | | | -107 |
| | Bands TDD-M1_E | | | | | -106 |
| $\hat{E}_s / I_{ot}$ | | dB | -12 | 12 | -12 | -12 |
| RSRP[Note3] | Bands TDD-M1_A | dBm/15 kHz | -90.5 | -90.5 | -110.5 | -120 |
| | Bands TDD-M1_C | | | | | -119 |
| | Bands TDD-M1_E | | | | | -118 |
| Io[Note3] | Bands TDD-M1_A | dBm/9 MHz | -50.45 | -50.45 | -70.45 | -86.76 |
| | Bands TDD-M1_C | | | | | -85.76 |
| | Bands TDD-M1_E | | | | | -84.76 |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -12 | -12 | -12 |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.67.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.11 and 9.1.21.12.

## A.9.1.68 3 DL RSRP for E-UTRAN in Carrier Aggregation with generic duplex modes

### A.9.1.68.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in

clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.1.37, A.9.1.38, A.9.1.39, A.9.1.40, does not need to be tested in the generic duplex-mode test case A.9.1.68.

## A.9.1.68.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2 and cell 4 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. Cell 3 and cell 5 are neighbouring cells on secondary component carriers SCC1 and SCC2 respectively. The test parameters are given in Table A.9.1.68.2-1.

**Table A.9.1.68.2-1: 3 Downlink RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |
| OCNG Patterns defined in A.3.2. | | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA[Note2] | | | | | | | |
| OCNG_RB[Note2] | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| | Bands FDD_A | | -117 | | | | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| | Bands FDD_A | | -121 | | | | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/ 50) | (Io for Channel 1+5.33dB+10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1+5.33dB+10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/ 50) | | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -87.26+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | -85.76+10log($N_{RB,c}$/ 50) | | | | |
| | Bands FDD_G | | -84.76+10log($N_{RB,c}$/ 50) | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_H | | -84.26+10log($N_{RB,c}$/50) | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | μs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.68.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 7 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.1.69 4 DL RSRP for E-UTRAN in Carrier Aggregation with generic duplex modes

### A.9.1.69.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.1.44, A.9.1.45, A.9.1.46, A.9.1.47, does not need to be tested in the generic duplex-mode test case A.9.1.69.

### A.9.1.69.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4 and cell 6 are activated SCells on secondary component carriers SCC1, SCC2 and SCC3 respectively. Cell 3, cell 5 and cell 7 are neighbouring cells on secondary component carriers SCC1, SCC2 and SCC3 respectively. The test parameters are given in Table A.9.1.44.2-1.

**Table A.9.1.69.2-1: 4 Downlink RSRP carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6 | Cell 7 |
|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | | 4 | |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | 6 | | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OCNG Patterns | | | 5MHz FDD: OP.15 FDD 10MHz FDD: OP.1 FDD 20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz FDD: OP.15 FDD 10MHz FDD: OP.1 FDD 20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD 10MHz FDD: OP.2 FDD 20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD 10MHz TDD: OP.2 TDD 20MHz TDD: OP.8 TDD | 5MHz FDD: OP.15 FDD 10MHz FDD: OP.1 FDD 20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD 10MHz FDD: OP.2 FDD 20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD 10MHz TDD: OP.2 TDD 20MHz TDD: OP.8 TDD | 5MHz FDD: OP.15 FDD 10MHz FDD: OP.1 FDD 20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD 10MHz FDD: OP.2 FDD 20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD 10MHz TDD: OP.2 TDD 20MHz TDD: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | | |
| PSS_RA | | | | | | | | | |
| SSS_RA | | | | | | | | | |
| PCFICH_RB | | | | | | | | | |
| PHICH_RA | | | | | | | | | |
| PHICH_RB | | | | | | | | | |
| PDCCH_RA | | | | | | | | | |
| PDCCH_RB | | | | | | | | | |
| PDSCH_RA | | | | | | | | | |
| PDSCH_RB | | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -117 | ($N_{oc}$ for Channel 1 +1dB) | | ($N_{oc}$ for Channel 1 +1dB) | | ($N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | | | | | |
| | Bands TDD_E | | -115 | | | | | | |
| | Bands FDD_A | | -117 | | | | | | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | -116.5 | | | | | | |
| | Bands FDD_C | | -116 | | | | | | |
| | Bands FDD_D | | -115.5 | | | | | | |
| | Bands FDD_E, FDD_F [Note 7] | | -115 | | | | | | |
| | Bands FDD_G | | -114 | | | | | | |
| | Bands FDD_H | | -113.5 | | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | | | | | |
| | Bands TDD_E | | -119 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Bands FDD_A | | -121 | | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | | | |
| | Bands FDD_C | | -120 | | | | | | |
| | Bands FDD_D | | -119.5 | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | | | |
| | Bands FDD_G | | -118 | | | | | | |
| | Bands FDD_H | | -117.5 | | | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel4}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 4 Note 8 | | | - | - | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

## A.9.1.69.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 10 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.70 5 DL RSRP for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.1.70.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.1.48, A.9.1.49, A.9.1.50, A.9.1.51, does not need to be tested in the generic duplex-mode test case A.9.1.70.

## A.9.1.70.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell 6 and cell 8 are activated SCells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. Cell 3, cell 5, cell 7 and cell 9 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3 and SCC4 respectively. The test parameters are given in Table A.9.1.70.2-1, Table A.9.1.70.2-2 and Table A.9.1.70.2-3.

**Table A.9.1.70.2-1: 5 Downlink RSRP carrier aggregation test parameters for cell 1, cell 2, cell 3, cell 4 and cell 5**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| TDD Special subframe configuration[Note1] | | 6 | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2. | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note2]<br>OCNG_RB[Note2] | | dB | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note3] | Bands TDD_A | | -117 | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands TDD_C | dBm/ 15 kHz | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| | Bands FDD_A | | -117 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| | Bands FDD_A | | -121 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | $-87.76+10\log(N_{RB,c}/50)$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | $-86.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands TDD_E | | $-85.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_A | | $-87.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | $-87.26+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_C | | $-86.76+10\log(N_{RB,c}/50)$ | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | μs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.70.2-2: 5 Downlink RSRP carrier aggregation test parameters for cell 6 and cell 7**

| Parameter | Unit | Cell 6 | Cell 7 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | |
| Duplex mode | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration Note1 | | 6 | |
| TDD Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36 | - |

| | | | | |
|---|---|---|---|---|
| | | | 20MHz: 38-61 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_H | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 [Note 10] | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F [Note 7] | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 [Note 8] | | | ≤ TAE | - |
| Time alignment error relative to cell 2 [Note 8] | | | ≤ TAE | |
| Time alignment error relative to cell 4 [Note 8] | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.70.2-3: 5 Downlink PCell in FDD RSRP carrier aggregation test parameters for cell 8 and cell 9**

| Parameter | Unit | Cell 8 | Cell 9 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 5 | |
| Duplex mode | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: | - |

| | | | | |
|---|---|---|---|---|
| | | | R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | | | |

| | | | | |
|---|---|---|---|---|
| | Bands TDD_C | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | ≤ TAE | |
| Time alignment error relative to cell 4 Note 8 | | | ≤ TAE | |
| Time alignment error relative to cell 6 Note 8 | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.70.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 13 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.71 6 DL RSRP for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.1.71.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.71.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell 6, cell 8 and cell 10 are activated SCells on secondary component carriers SCC1, SCC2, SCC3, SCC4 and SCC5 respectively. Cell 3, cell 5, cell 7, cell 9 and cell 11 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3, SCC4 and SCC5 respectively. For testing the requirement related to a given SCell, the presence of at least the respective intra-frequency neigbouring cell (i.e. on the same secondary component carrier) is required. The test parameters are given in Table A.9.1.71.2-1, Table A.9.1.71.2-2 and Table A.9.1.71.2-3.

**Table A.9.1.71.2-1: 6 Downlink RSRP carrier aggregation test parameters for cell 1, cell 2, cell 3, cell 4 and cell 5**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 20MHz: $N_{RB,c}$ = 100 | | | | |
| TDD Special subframe configuration[Note1] | | 6 | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | 1 | |
| Measurement bandwidth | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - |
| PDSCH allocation | | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2. | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note2] | | | | | | |
| OCNG_RB[Note2] | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| | Bands FDD_A | | -117 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s/I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| | Bands FDD_A | | -121 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |
| | Bands TDD_E | | -85.76+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_A | | -87.76+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -87.26+10log($N_{RB,c}$/50) | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_D | | -86.26+10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -85.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_G | | -84.76 +10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_H | | -84.26 +10log($N_{RB,c}$/50) | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | μs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.71.2-2: 6 Downlink RSRP carrier aggregation test parameters for cell 6, cell 7, cell 8 and cell 9**

| Parameter | Unit | Cell 6 | Cell 7 | Cell 8 | Cell 9 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | | 5 | |
| Duplex mode | | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration Note1 | | 6 | | 6 | |
| TDD Uplink/downlink configuration Note1 | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: | - | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | R.0 TDD<br>20MHz TDD:<br>R.3 TDD | | R.0 TDD<br>20MHz TDD:<br>R.3 TDD | |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note2 | | | | | | |
| OCNG_RB Note2 | | | | | | |
| Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 | 3 | -1 |
| | | dB | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| $Io^{Note4}$ | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 4 Note 8 | | | ≤ TAE | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz

**Table A.9.1.71.2-3: 6 Downlink RSRP carrier aggregation test parameters for cell 10 and cell 11**

| Parameter | Unit | Cell 10 | Cell 11 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 6 | |
| Duplex mode | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration Note1 | | 6 | |
| TDD Uplink/downlink configuration Note1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD | - |

| | | | | |
|---|---|---|---|---|
| | | | 5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 |
| | | dB | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| $Io^{Note4}$ | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 7 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | ≤ TAE | |
| Time alignment error relative to cell 4 Note 8 | | | ≤ TAE | |
| Time alignment error relative to cell 6 Note 8 | | | ≤ TAE | |
| Time alignment error relative to cell 8 Note 8 | | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.71.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 13 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRP measurements for Cell 10 on SCC5 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of intra-frequency RSRP measurements for Cell 11 relative to Cell 10 on SCC5 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRP measurements between SCC5 and the primary component carriers for Cell 10 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.72 7 DL RSRP for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.1.72.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP absolute and relative accuracy requirements in carrier aggregation are within the specified limits. This test will verify the absolute RSRP accuracy requirements of the primary component carrier defined in clause 9.1.11.1, the absolute RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2, and the relative RSRP accuracy requirements of the secondary component carriers defined in clause 9.1.11.2. The test will also verify the primary and secondary component carriers' relative RSRP accuracy requirement defined in Clause 9.1.11.3.

## A.9.1.72.2 Test parameters

In this set of test cases cell 1 is PCell on the primary component carrier, and cell 2, cell 4, cell 6, cell 8, cell 10 and cell12 are activated SCells on secondary component carriers SCC1, SCC2, SCC3, SCC4, SCC5 and SCC6 respectively. Cell 3, cell 5, cell 7, cell 9, cell 11 and cell 13 are neighbouring cells on secondary component carriers SCC1, SCC2, SCC3, SCC4, SCC5 and SCC6 respectively. For testing the requirement related to a given SCell, the presence of at least the respective intra-frequency neigbouring cell (i.e. on the same secondary component carrier) is required. The test parameters are given in Table A.9.1.72.2-1, Table A.9.1.72.2-2 and Table A.9.1.72.2-3.

**Table A.9.1.72.2-1: 7 Downlink RSRP carrier aggregation test parameters for cell 1, cell 2, cell 3, cell 4 and cell 5**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | | 3 | |
| Duplex mode | | FDD or TDD | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | 1 | |
| Measurement bandwidth | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1. | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - |
| PDSCH allocation | | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2. | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2. | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note2 | | | | | | | |
| OCNG_RB Note2 | | | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15 kHz | -117 | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | -116 | | | | |
| | Bands TDD_E | | -115 | | | | |
| | Bands FDD_A | | -117 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -116.5 | | | | |
| | Bands FDD_C | | -116 | | | | |
| | Bands FDD_D | | -115.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -115 | | | | |
| | Bands FDD_G | | -114 | | | | |
| | Bands FDD_H | | -113.5 | | | | |
| | | dB | -4 | 3 | -1 | 3 | -1 |
| $\hat{E}_s/I_{ot}$ | | dB | -4 | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15 kHz | -121 | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | -120 | | | | |
| | Bands TDD_E | | -119 | | | | |
| | Bands FDD_A | | -121 | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -120.5 | | | | |
| | Bands FDD_C | | -120 | | | | |
| | Bands FDD_D | | -119.5 | | | | |
| | Bands FDD_E, FDD_F Note 7 | | -119 | | | | |
| | Bands FDD_G | | -118 | | | | |
| | Bands FDD_H | | -117.5 | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.76+10log($N_{RB,c}$/50) | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel2}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | -86.76+10log($N_{RB,c}$/50) | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands TDD_E | | $-85.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_A | | $-87.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | $-87.26+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_C | | $-86.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_D | | $-86.26+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_E, FDD_F Note 7 | | $-85.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_G | | $-84.76+10\log(N_{RB,c}/50)$ | | | | |
| | Bands FDD_H | | $-84.26+10\log(N_{RB,c}/50)$ | | | | |
| Propagation condition | | - | AWGN | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to cell 1 | | µs | - | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | - | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | - | - | - | ≤ TAE | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.72.2-2: 7 Downlink RSRP carrier aggregation test parameters for cell 6, cell 7, cell8 and cell 9**

| | | | | | |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | | 5 | |
| Duplex mode | | FDD or TDD | | FDD or TDD | |
| BW$_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.16 FDD<br>10MHz FDD:<br>OP.2 FDD<br>20MHz FDD:<br>OP.12 FDD<br><br>5MHz TDD:<br>OP.10 TDD<br>10MHz TDD:<br>OP.2 TDD<br>20MHz TDD:<br>OP.8 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note2] | dB | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| OCNG_RB[Note2] | | | | | | |
| Note3 | Bands TDD_A<br>Bands TDD_C<br>Bands TDD_E<br>Bands FDD_A<br>Bands FDD_B1, FDD_B2 [Note 10]<br>Bands FDD_C<br>Bands FDD_D<br>Bands FDD_E, FDD_F [Note 7]<br>Bands FDD_G<br>Bands FDD_H | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 | 3 | -1 |
| | | dB | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP[Note4] | Bands TDD_A<br>Bands TDD_C<br>Bands TDD_E<br>Bands FDD_A<br>Bands FDD_B1, FDD_B2 [Note 10]<br>Bands FDD_C<br>Bands FDD_D<br>Bands FDD_E, FDD_F [Note 7]<br>Bands FDD_G<br>Bands FDD_H | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| Io[Note4] | Bands TDD_A<br>Bands TDD_C<br>Bands TDD_E<br>Bands FDD_A<br>Bands FDD_B1, FDD_B2 [Note 10]<br>Bands FDD_C<br>Bands FDD_D<br>Bands FDD_E, FDD_F [Note 7]<br>Bands FDD_G<br>Bands FDD_H | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 [Note 8] | | | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 [Note 8] | | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 4 [Note 8] | | | ≤ TAE | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.1.72.2-3: 7 Downlink RSRP carrier aggregation test parameters for cell 10, cell 11, cell 12 and cell 13**

| Parameter | Unit | Cell 10 | Cell 11 | Cell 12 | Cell 13 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 6 | | 7 | |
| Duplex mode | | FDD or TDD | | FDD or TDD | |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | |
| TDD Special subframe configuration[Note1] | | 6 | | 6 | |
| TDD Uplink/downlink configuration[Note1] | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - | 5MHz FDD: R.5 FDD<br>10MHz FDD: R.0 FDD<br>20MHz FDD: R.4 FDD<br><br>5MHz TDD: R.4 TDD<br>10MHz TDD: R.0 TDD<br>20MHz TDD: R.3 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |
| OCNG Patterns defined in A.3.2.2 | | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.16 FDD<br>10MHz FDD: OP.2 FDD<br>20MHz FDD: OP.12 FDD<br><br>5MHz TDD: OP.10 TDD<br>10MHz TDD: OP.2 TDD<br>20MHz TDD: OP.8 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB | dB | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note2 | | | | | | |
| OCNG_RB Note2 | | | | | | |
| Note3 | Bands TDD_A | dBm/ 15kHz | ( $N_{oc}$ for Channel 1 +1dB) | | ( $N_{oc}$ for Channel 1 +1dB) | |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | -1 | 3 | -1 |
| | | dB | 0.46 | -5.76 | 0.46 | -5.76 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) | (RSRP for Cell 1 +8dB) | (RSRP for Cell 1 +4dB) |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | | (Io for Channel 1 +5.33dB +10log ($N_{RB\ channel3}$ / $N_{RB\ channel\ 1}$)) | |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | | | | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 3 | 0 | 3 |
| Time alignment error relative to cell 1 Note 8 | | | ≤ TAE | - | ≤ TAE | - |
| Time alignment error relative to cell 2 Note 8 | | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 4 Note 8 | | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 6 Note 8 | | | ≤ TAE | | ≤ TAE | |
| Time alignment error relative to cell 8 Note 8 | | | ≤ TAE | | ≤ TAE | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

| | |
|---|---|
| Note 4: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 8: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 9: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 10: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.72.3 Test Requirements

In the test, the performance of RSRP measurements is verified from the following 13 perspectives:

- The absolute accuracy of intra-frequency RSRP measurements for Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 10 on SCC5 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRP measurements for Cell 12 on SCC6 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 3 relative to Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 5 relative to Cell 4 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 7 relative to Cell 6 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 9 relative to Cell 8 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 11 relative to Cell 10 on SCC5 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of intra-frequency RSRP measurements for Cell 13 relative to Cell 12 on SCC6 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRP measurements between SCC1 and the primary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC2 and the primary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC3 and the primary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC4 and the primary component carriers for Cell 8 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC5 and the primary component carriers for Cell 10 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRP measurements between SCC5 and the primary component carriers for Cell 12 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.1.73 FDD Intra frequency case for CA Idle Mode Measurements

## A.9.1.73.1 Test Purpose and Environment

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.2B.2 for FDD intra frequency measurements.

## A.9.1.73.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Only absolute accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.1.2-1. In all test cases, Cell 1 is the serving cell and Cell 2 the target cell.

**Table A.9.1.73.2-1: RSRP FDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD_A [Note 8] | dBm/15 kHz | [-96] | | [-88] | | -116 | |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | -114 | |
| | Bands FDD_G [Note 7] | | | | | | -113 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_H | | | | | | -112.5 | |
| $\hat{E}_s / I_{ot}$ | | dB | [2.21] | [-3.97] | [1.24] | [-3.97] | [1.24] | [-3.97] |
| RSRP[Note3] | Bands FDD_A [Note 8] | dBm/15 kHz | [-90] | [-93] | [-82] | [-85] | [-110] | [-113] |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | [-109.5] | [-112.5] |
| | Bands FDD_C | | | | | | [-109] | [-112] |
| | Bands FDD_D | | | | | | [-108.5] | [-111.5] |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | [-108] | [-111] |
| | Bands FDD_G [Note 7] | | | | | | [-107] | [-110] |
| | Bands FDD_H | | | | | | [-106.5] | [-109.5] |
| Io[Note3] | Bands FDD_A [Note 8] | dBm/9 MHz | [-59.78] | | [-51.78] | | [-79.78] | |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | [-79.28] | |
| | Bands FDD_C | | | | | | [-78.78] | |
| | Bands FDD_D | | | | | | [-78.28] | |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | [-77.78] | |
| | Bands FDD_G [Note 7] | | | | | | [-76.78] | |
| | Bands FDD_H | | | | | | [-76.28] | |
| $\hat{E}_s / N_{oc}$ | | dB | [6] | [3] | [6] | [3] | [6] | [3] |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.73.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.2B.2.

## A.9.1.74 FDD—FDD Inter frequency case for CA Idle Mode Measurements for overlapping carrier

### A.9.1.74.1 Test Purpose and Environment

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3B.2 for FDD—FDD inter frequency measurements.

## A.9.1.74.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.74.2-1 In all test cases, Cell 1 is the serving and Cell 2 the target cell.

**Table A.9.1.74.2-1: RSRP FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note 1 | | | | | | |
| OCNG_RB Note 1 | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | [-95] | [-95] | ($N_{oc}$ for Channel 2 +8dB) | [-117] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-116.5] |
| | Bands FDD_C | | | | | [-116] |
| | Bands FDD_D | | | | | [-115.5] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-115] |
| | Bands FDD_G Note 7 | | | | | [-114] |
| | Bands FDD_H | | | | | [-113.5] |
| $\hat{E}_s / I_{ot}$ | | dB | [10] | [10] | 13 | [-4] |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | [-85] | [-85] | (RSRP for Cell 2 +25dB) | [-121] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-120.5] |
| | Bands FDD_C | | | | | [-120] |
| | Bands FDD_D | | | | | [-119.5] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-119] |
| | Bands FDD_G Note 7 | | | | | [-118] |
| | Bands FDD_H | | | | | [-117.5] |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | [-56.81] | [-56.81] | (Io for Channel 2 +19.75dB) | [-87.76] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-87.26] |
| | Bands FDD_C | | | | | [-86.76] |
| | Bands FDD_D | | | | | [-86.26] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-85.76] |
| | Bands FDD_G Note 7 | | | | | [-84.76] |
| | Bands FDD_H | | | | | [-84.26] |
| $\hat{E}_s / N_{oc}$ | | dB | [10] | [10] | 13 | [-4] |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 7: | Except Band 29. |
| Note 8: | Except Band 32, Band 75, Band 76. |
| Note 9: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.74.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3B.2.

## A.9.1.75 FDD—FDD Inter frequency case for CA Idle Mode Measurements for non-overlapping carrier

### A.9.1.75.1 Test Purpose and Environment

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.3B.3 for FDD—FDD inter frequency measurements.

### A.9.1.75.2 Test parameters

In this set of test cases the cells are on different carrier frequencies. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.9.1.75.2-1 In all test cases, Cell 1 is the serving and Cell 2 the target cell.

**Table A.9.1.74.2-1: RSRP FDD—FDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| PDSCH_RB | | | | | | |
| OCNG_RANote1 | | | | | | |
| OCNG_RBNote | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | [-95] | [-95] | ($N_{oc}$ for Channel 2 +8dB) | [-117] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-116.5] |
| | Bands FDD_C | | | | | [-116] |
| | Bands FDD_D | | | | | [-115.5] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-115] |
| | Bands FDD_G Note 7 | | | | | [-114] |
| | Bands FDD_H | | | | | [-113.5] |
| $\hat{E}_s / I_{ot}$ | | dB | [10] | [10] | 13 | [-4] |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | [-85] | [-85] | (RSRP for Cell 2 +25dB) | [-121] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-120.5] |
| | Bands FDD_C | | | | | [-120] |
| | Bands FDD_D | | | | | [-119.5] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-119] |
| | Bands FDD_G Note 7 | | | | | [-118] |
| | Bands FDD_H | | | | | [-117.5] |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | [-56.81] | [-56.81] | (Io for Channel 2 +19.75dB) | [-87.76] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | [-87.26] |
| | Bands FDD_C | | | | | [-86.76] |
| | Bands FDD_D | | | | | [-86.26] |
| | Bands FDD_E, FDD_F Note 5 | | | | | [-85.76] |
| | Bands FDD_G Note 7 | | | | | [-84.76] |
| | Bands FDD_H | | | | | [-84.26] |
| $\hat{E}_s / N_{oc}$ | | dB | [10] | [10] | 13 | [-4] |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.74.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.3B.3.

## A.9.1.76 FD-FDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeA

### A.9.1.76.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 for FD-FDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeA.

## A.9.1.76.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.76.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.76.2-1.

**Table A.9.1.76.2-1: FD-FDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.20 FDD | - | R.20 FDD | - | R.20 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.20 FDD | - | Follows R.20 FDD | - | Follows R.20 FDD | - |
| MPDCCH Reference measurement channel | | | R.16 FDD | | R.16 FDD | | R.16 FDD | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-M1_B Note 6 | | | | | | -115.5 | |
| | Bands FDD-M1_C | | | | | | -115 | |
| | Bands FDD-M1_D | | | | | | -114.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -114 | |
| | Bands FDD-M1_G | | | | | | -113 | |
| | Bands FDD-M1_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP Note3 | Bands FDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-M1_B Note 6 | | | | | | -112.5 | -116.5 |
| | Bands FDD-M1_C | | | | | | -112 | -116 |
| | Bands FDD-M1_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -111 | -115 |
| | Bands FDD-M1_G | | | | | | -110 | -114 |
| | Bands FDD-M1_H | | | | | | -109.5 | -113.5 |
| Io Note3 | Bands FDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands FDD-M1_B Note 6 | | | | | | -81.93 | |
| | Bands FDD-M1_C | | | | | | -81.43 | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD-M1_D | | | | -80.93 |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | -80.43 |
| | Bands FDD-M1_G | | | | -79.43 |
| | Bands FDD-M1_H | | | | -78.93 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x1 | 1x1 | 1x1 |
| RSS duration | | ms | 8 | | |
| RSS frequency location | | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | |
| RSS perodicity | | ms | 160 | | |
| RSS power boost | | dB | 0 | | |
| RSS time offset | | ms | 0 | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.1.76.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1.

## A.9.1.77 HD-FDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeA

### A.9.1.77.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 for HD-FDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.77.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.77.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.77.2-1.

**Table A.9.1.77.2-1: HD-FDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | R.10 HD-FDD | - | R.10 HD-FDD | - | R.10 HD-FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.10 | - | Follows R.10 | - | Follows R.10 | - |

| | | | HD-FDD | | HD-FDD | | HD-FDD | |
|---|---|---|---|---|---|---|---|---|
| MPDCCH Reference measurement channel | | | R.6 HD-FDD | | R.6 HD-FDD | | R.6 HD-FDD | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands FDD-M1_B | | | | | | -115.5 | |
| | Bands FDD-M1_C | | | | | | -115 | |
| | Bands FDD-M1_D | | | | | | -114.5 | |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -114 | |
| | Bands FDD-M1_G | | | | | | -113 | |
| | Bands FDD-M1_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRP[Note3] | Bands FDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands FDD-M1_B | | | | | | -112.5 | -116.5 |
| | Bands FDD-M1_C | | | | | | -112 | -116 |
| | Bands FDD-M1_D | | | | | | -111.5 | -115.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -111 | -115 |
| | Bands FDD-M1_G | | | | | | -110 | -114 |
| | Bands FDD-M1_H | | | | | | -109.5 | -113.5 |
| Io[Note3] | Bands FDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands FDD-M1_B | | | | | | -81.93 | |
| | Bands FDD-M1_C | | | | | | -81.43 | |
| | Bands FDD-M1_D | | | | | | -80.93 | |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -80.43 | |
| | Bands FDD-M1_G | | | | | | -79.43 | |
| | Bands FDD-M1_H | | | | | | -78.93 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| RSS duration | | ms | 8 | | | | | |
| RSS frequency location | | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | | | | |
| RSS perodicity | | ms | 160 | | | | | |
| RSS power boost | | dB | 0 | | | | | |
| RSS time offset | | ms | 0 | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.77.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1.

## A.9.1.78 TDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeA

### A.9.1.78.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.1 for TDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeA.

### A.9.1.78.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.78.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.78.2-1.

**Table A.9.1.78.2-1: TDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.16 TDD | - | R.16 TDD | - | R.16 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.16 TDD | - | Follows R.16 TDD | - | Follows R.16 TDD | - |
| MPDCCH Reference measurement channel | | | R.14 TDD | | R.14 TDD | | R.14 TDD | |
| OCNG Patterns | | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD-M1_A | dBm/15 kHz | -106 | | -86 | | -116 | |
| | Bands TDD-M1_C | | | | | | -115 | |
| | Bands TDD-M1_E | | | | | | -114 | |
| $\hat{E}_s / N_{oc}$ | | dB | 6 | 1 | 6 | 1 | 3 | -1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | | dB | 2.5 | -6 | 2.5 | -6 | 0.5 | -5.76 |
| RSRP[Note4] | Bands TDD-M1_A | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| | Bands TDD-M1_C | | | | | | -112 | -116 |
| | Bands TDD-M1_E | | | | | | -111 | -115 |
| Io[Note4] | Bands TDD-M1_A | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| | Bands TDD-M1_C | | | | | | -81.43 | |
| | Bands TDD-M1_E | | | | | | -80.43 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| RSS duration | | ms | 8 | | | | | |
| RSS frequency location | | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | | | | |
| RSS perodicity | | ms | 160 | | | | | |
| RSS power boost | | dB | 0 | | | | | |
| RSS time offset | | ms | 0 | | | | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.78.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.1.

## A.9.1.79 FD-FDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.79.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 for FD-FDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.79.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.79.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.79.2-1.

**Table A.9.1.79.2-1: FD-FDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | | |
| PDSCH Reference measurement channel | | | R.22 FDD | - | R.22 FDD | - | R.22 FDD | - | |
| PDSCH allocation | | $n_{PRB}$ | Follows R.22 FDD | - | Follows R.22 FDD | - | Follows R.22 FDD | - | |
| MPDCCH Reference measurement channel | | | R.18 FDD | | R.18 FDD | | R.18 FDD | | |
| OCNG Patterns | | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>MPDCCH_RA<br>MPDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 | |
| b $N_{oc}$ [Note2] | Bands FDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | | |
| | Bands FDD-M1_B Note 6 | | | | | | -106.5 | | |
| | Bands FDD-M1_C | | | | | | -106 | | |
| | Bands FDD-M1_D | | | | | | -105.5 | | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -105 | | |
| | Bands FDD-M1_G | | | | | | -104 | | |
| | Bands FDD-M1_H | | | | | | -103.5 | | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 | |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 | |
| RSRP[Note3] | Bands FDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 | |
| | Bands FDD-M1_B Note 6 | | | | | | -118.5 | -120.5 | |
| | Bands FDD-M1_C | | | | | | -118 | -120 | |
| | Bands FDD-M1_D | | | | | | -117.5 | -119.5 | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -117 | -119 | |
| | Bands FDD-M1_G | | | | | | -116 | -118 | |
| | Bands FDD-M1_H | | | | | | -115.5 | -117.5 | |
| Io[Note3] | Bands FDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | | |
| | Bands FDD-M1_B Note 6 | | | | | | -78.29 | | |
| | Bands FDD-M1_C | | | | | | -77.79 | | |
| | Bands FDD-M1_D | | | | | | -77.29 | | |
| | Bands FDD-M1_E, FDD-M1_F Note 4 | | | | | | -76.79 | | |
| | Bands FDD-M1_G | | | | | | -75.79 | | |
| | Bands FDD-M1_H | | | | | | -75.29 | | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | | |
| RSS duration | | ms | 8 | | | | | | |
| RSS frequency location | | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | | | | | |
| RSS perodicity | | ms | 160 | | | | | | |
| RSS power boost | | dB | 0 | | | | | | |
| RSS time offset | | ms | 0 | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 3: | Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 5: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 6: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.1.79.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3.

## A.9.1.80 HD-FDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.80.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 for HD-FDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeB.

### A.9.1.80.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.80.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.80.2-1.

**Table A.9.1.80.2-1: HD-FDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | R.12 HD-FDD | - | R.12 HD-FDD | - | R.12 HD-FDD | - |
| PDSCH allocation | $n_{PRB}$ | Follows R.12 HD-FDD | - | Follows R.12 HD-FDD | - | Follows R.12 HD-FDD | - |
| MPDCCH Reference measurement channel | | R.8 HD-FDD | | R.8 HD-FDD | | R.8 HD-FDD | |
| OCNG Patterns | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| MPDCCH_RA | | | | | | | |
| MPDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA[Note1] | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OCNG_RB[Note1] | | | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | |
| | Bands FDD-M1_B | | | | | | -106.5 | |
| | Bands FDD-M1_C | | | | | | -106 | |
| | Bands FDD-M1_D | | | | | | -105.5 | |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -105 | |
| | Bands FDD-M1_G | | | | | | -104 | |
| | Bands FDD-M1_H | | | | | | -103.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP[Note3] | Bands FDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 |
| | Bands FDD-M1_B | | | | | | -118.5 | -120.5 |
| | Bands FDD-M1_C | | | | | | -118 | -120 |
| | Bands FDD-M1_D | | | | | | -117.5 | -119.5 |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -117 | -119 |
| | Bands FDD-M1_G | | | | | | -116 | -118 |
| | Bands FDD-M1_H | | | | | | -115.5 | -117.5 |
| Io[Note3] | Bands FDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | |
| | Bands FDD-M1_B | | | | | | -78.29 | |
| | Bands FDD-M1_C | | | | | | -77.79 | |
| | Bands FDD-M1_D | | | | | | -77.29 | |
| | Bands FDD-M1_E, FDD-M1_F [Note 4] | | | | | | -76.79 | |
| | Bands FDD-M1_G | | | | | | -75.79 | |
| | Bands FDD-M1_H | | | | | | -75.29 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |
| RSS duration | | ms | 8 | | | | | |
| RSS frequency location | | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | | | | |
| RSS perodicity | | ms | 160 | | | | | |
| RSS power boost | | dB | 0 | | | | | |
| RSS time offset | | ms | 0 | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.80.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3.

## A.9.1.81 TDD RSS based RSRP Intra frequency case for Cat-M1 UE in CEModeB

### A.9.1.81.1 Test Purpose and Environment

The purpose of this test is to verify that the RSS based RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21.3 for TDD intra frequency RSS based RSRP measurements for Cat-M1 UE in CEModeB.

## A.9.1.78.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Absolute accuracy of RSS based RSRP intra frequency measurements are tested by using the parameters in Table A.9.1.81.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. All the tests contain MPDCCH for UL grant for reporting RSRP.

RSS measurement is enabled for intra-frequency measurement with *MeasRSS-DedicatedConfig* setup. RSS are transmitted by Cell 1 and Cell 2 in the same time and frequency resources with *rss-ConfigCarrierInfo* absent in *MeasRSS-DedicatedConfig*. Other RSS related parameters for Cell 1 and Cell 2 are defined in Table A.9.1.81.2-1.

**Table A.9.1.81.2-1: TDD RSS based RSRP Intra frequency test parameters for Cat-M1 UE in CEModeB**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink/downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel | | | R.18 TDD | - | R.18 TDD | - | R.18 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | Follows R.18 TDD | - | Follows R.18 TDD | - | Follows R.18 TDD | - |
| MPDCCH Reference measurement channel | | | R.16 TDD | | R.16 TDD | | R.16 TDD | |
| OCNG Patterns | | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| MPDCCH_RA | | | | | | | | |
| MPDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD-M1_A | dBm/15 kHz | -99 | | -79 | | -107 | |
| | Bands TDD-M1_C | | | | | | -106 | |
| | Bands TDD-M1_E | | | | | | -105 | |
| $\hat{E}_s / N_{oc}$ | | dB | -12 | -14 | -12 | -14 | -12 | -14 |
| $\hat{E}_s / I_{ot}$ [Note4] | | dB | -12.17 | -14.27 | -12.17 | -14.27 | -12.17 | -14.27 |
| RSRP[Note4] | Bands TDD-M1_A | dBm/15 kHz | -111 | -113 | -91 | -93 | -119 | -121 |
| | Bands TDD-M1_C | | | | | | -118 | -120 |
| | Bands TDD-M1_E | | | | | | -117 | -119 |
| Io[Note4] | Bands TDD-M1_A | dBm/9 MHz | -70.79 | | -50.79 | | -78.79 | |
| | Bands TDD-M1_C | | | | | | -77.79 | |
| | Bands TDD-M1_E | | | | | | -76.79 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

| | | | | |
|---|---|---|---|---|
| Correlation Matrix and Antenna Configuration | | 1x1 | 1x1 | 1x1 |
| RSS duration | ms | 8 | | |
| RSS frequency location | | RB index corresponding to the lowest RB of the MPDCCH narrowband | | |
| RSS perodicity | ms | 160 | | |
| RSS power boost | dB | 0 | | |
| RSS time offset | ms | 0 | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.1.81.3 Test Requirements

The RSS based RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21.3.

## A.9.2 RSRQ

### A.9.2.1 FDD Intra frequency case

#### A.9.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.5.1.

#### A.9.2.1.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.1.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.1.2-1: RSRQ FDD Intra frequency test parameters**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -84.76 | -84.76 | -103.85 | -103.85 | -116 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -114 | |
| | Bands FDD_G Note 7 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| $\hat{E}_s/I_{ot}$ | | dB | -1.76 | -1.76 | -4.7 | -4.7 | -5.46 | -5.46 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -81.76 | -81.76 | -106.75 | -106.75 | -120 | -120 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -119.5 | -119.5 |
| | Bands FDD_C | | | | | | -119 | -119 |
| | Bands FDD_D | | | | | | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -118 | -118 |
| | Bands FDD_G Note 7 | | | | | | -117 | -117 |
| | Bands FDD_H | | | | | | -116.5 | -116.5 |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | | |
| | Bands FDD_G Note 7 | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50 | -50 | -73 | -73 | -85.67 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -85.17 | |
| | Bands FDD_C | | | | | | -84.67 | |
| | Bands FDD_D | | | | | | -84.17 | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -83.67 | |
| | Bands FDD_G Note 7 | | | | | | -82.67 | |
| | Bands FDD_H | | | | | | -82.17 | |
| $\hat{E}_s/N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 7: | Except Band 29. |
| Note 8: | Except Band 32, Band 75, Band 76. |
| Note 9: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

#### A.9.2.1.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in section 9.1.5.1. The RSRQ measurement accuracy for UE Category 1bis shall fulfil the requirements in section 9.1.5.5.

### A.9.2.2 TDD Intra frequency case

#### A.9.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.5.1.

#### A.9.2.2.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.2.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.2.2-1: RSRQ TDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | | 6 | |
| Uplink-downlink configuration[Note1] | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$[Note3] | Bands TDD_A | dBm/15 kHz | -84.76 | -84.76 | -103.85 | -103.85 | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | -1.76 | -1.76 | -4.7 | -4.7 | -5.46 | -5.46 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -81.76 | -81.76 | -106.75 | -106.75 | -120 | -120 |
| | Bands TDD_C | | | | | | -119 | -119 |
| | Bands TDD_E | | | | | | -118 | -118 |
| RSRQ[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -50 | -50 | -73 | -73 | -85.67 | |
| | Bands TDD_C | | | | | | -84.67 | |
| | Bands TDD_E | | | | | | -83.67 | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.2.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in section 9.1.5.1. The RSRQ measurement accuracy for UE Category 1bis shall fulfil the requirements in section 9.1.5.5.

## A.9.2.3 FDD—FDD Inter frequency case

### A.9.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6.1 and 9.1.6.2.

### A.9.2.3.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.3.2-1. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.3.2-1: RSRQ FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | - | 0 | - | 0 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD_A [Note 8] | dBm/15 kHz | -80 | -80 | -104.70 | -104.70 | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | -119 | -119 |
| | Bands FDD_C | | | | | | -118.5 | -118.5 |
| | Bands FDD_D | | | | | | -118 | -118 |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | -117.5 | -117.5 |
| | Bands FDD_G [Note 7] | | | | | | -116.5 | -116.5 |
| | Bands FDD_H | | | | | | -116 | -116 |
| $\hat{E}_s / I_{ot}$ | | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| RSRP[Note3] | Bands FDD_A [Note 8] | dBm/15 kHz | -81.75 | -81.75 | -108.70 | -108.70 | -123.5 | -123.5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -123 | -123 |
| | Bands FDD_C | | | | | | -122.5 | -122.5 |
| | Bands FDD_D | | | | | | -122 | -122 |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -121.5 | -121.5 |
| | Bands FDD_G Note 7 | | | | | | -120.5 | -120.5 |
| | Bands FDD_H | | | | | | -120 | -120 |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | -14.76 | -14.76 | -16.25 | -16.25 | -16.25 | -16.25 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | | |
| | Bands FDD_G Note 7 | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50 | -50 | -75.46 | -75.46 | -90.26 | -90.26 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | -89.76 | -89.76 |
| | Bands FDD_C | | | | | | -89.26 | -89.26 |
| | Bands FDD_D | | | | | | -88.76 | -88.76 |
| | Bands FDD_E, FDD_F Note 5 | | | | | | -88.26 | -88.26 |
| | Bands FDD_G Note 7 | | | | | | -87.26 | -87.26 |
| | Bands FDD_H | | | | | | -86.76 | -86.76 |
| $\hat{E}_s / N_{oc}$ | | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.3.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in sections 9.1.6.1 and 9.1.6.2. The RSRQ measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.6.5 and 9.1.6.6.

## A.9.2.4 TDD—TDD Inter frequency case

### A.9.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6.1 and 9.1.6.2.

### A.9.2.4.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.4.2-1 for TDD configuration 1 and in Table A.9.2.4.2-2 for TDD configuration 0. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A 9.2.4.2-1: RSRQ TDD—TDD Inter frequency test parameters for TDD configuration 1**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | - | 0 | - | 0 | - |
| Special subframe configuration Note1 | | | 6 | | 6 | | 6 | |
| Uplink-downlink configuration Note1 | | | 1 | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note2 | | | | | | | | |
| OCNG_RB Note2 | | | | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -80 | -80 | -104.70 | -104.70 | -119.50 | -119.50 |
| | Bands TDD_C | | | | | | -118.50 | -118.50 |
| | Bands TDD_E | | | | | | -117.50 | -117.50 |
| $\hat{E}_s / I_{ot}$ | | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -81.75 | -81.75 | -108.70 | -108.70 | -123.50 | -123.50 |
| | Bands TDD_C | | | | | | -122.50 | -122.50 |
| | Bands TDD_E | | | | | | -121.50 | -121.50 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -14.76 | -14.76 | -16.25 | -16.25 | -16.25 | -16.25 |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -50 | -50 | -75.46 | -75.46 | -90.26 | -90.26 |
| | Bands TDD_C | | | | | | -89.26 | -89.26 |
| | Bands TDD_E | | | | | | -88.26 | -88.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A 9.2.4.2-2: RSRQ TDD—TDD Inter frequency test parameters for *TDD configuration 0***

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|

| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | - | 0 | - | 0 | - |
| Special subframe configuration Note1 | | 6 | | 6 | | 6 | |
| Uplink-downlink configuration Note1 | | 0 | | 0 | | 0 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.5 TDD | - | R.5 TDD | - | R.5 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note2<br>OCNG_RB Note2 | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note3 Bands TDD_A | dBm/15 kHz | -80 | -80 | -104.70 | -104.70 | -119.50 | -119.50 |
| $N_{oc}$ Note3 Bands TDD_C | dBm/15 kHz | -80 | -80 | -104.70 | -104.70 | -118.50 | -118.50 |
| $N_{oc}$ Note3 Bands TDD_E | dBm/15 kHz | -80 | -80 | -104.70 | -104.70 | -117.50 | -117.50 |
| $\hat{E}_s/I_{ot}$ | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| RSRP Note4 Bands TDD_A | dBm/15 kHz | -81.75 | -81.75 | -108.70 | -108.70 | -123.50 | -123.50 |
| RSRP Note4 Bands TDD_C | dBm/15 kHz | -81.75 | -81.75 | -108.70 | -108.70 | -122.50 | -122.50 |
| RSRP Note4 Bands TDD_E | dBm/15 kHz | -81.75 | -81.75 | -108.70 | -108.70 | -121.50 | -121.50 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -14.76 | -14.76 | -16.25 | -16.25 | -16.25 | -16.25 |
| Io Note4 Bands TDD_A | dBm/9 MHz | -50 | -50 | -75.46 | -75.46 | -90.26 | -90.26 |
| Io Note4 Bands TDD_C | dBm/9 MHz | -50 | -50 | -75.46 | -75.46 | -89.26 | -89.26 |
| Io Note4 Bands TDD_E | dBm/9 MHz | -50 | -50 | -75.46 | -75.46 | -88.26 | -88.26 |
| $\hat{E}_s/N_{oc}$ | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| Propagation condition | - | AWGN | | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.4.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in sections 9.1.6.1 and 9.1.6.2. The RSRQ measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.6.5 and 9.1.6.6.

# A.9.2.4A FDD—TDD Inter frequency case

## A.9.2.4A.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6.1 and 9.1.6.2 for FDD—TDD inter frequency measurements.

## A.9.2.4A.2 Test parameters

In this set of test cases the two cells are on different carrier frequencies. Both absolute and relative accuracy of RSRQ inter frequency measurements are tested by using the parameters in Table A.9.2.4A.2-1 and Table A.9.2.4A.2-2. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. Cell 1 is FDD cell and Cell 2 is TDD cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.2.4A.2-1: RSRQ FDD—TDD Inter frequency test parameters (FDD Cell1)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 1 | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | 1 | 1 | 1 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | 0 | 0 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | R.0 FDD | R.0 FDD |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -80 | -104.70 | -114.5 |
| $\hat{E}_s / I_{ot}$ | dB | -1.75 | -4.0 | -4.0 |
| RSRP Note3 | dBm/15 kHz | -81.75 | -108.70 | -118.5 |
| RSRQ Note3 | dB | -14.76 | -16.25 | -16.25 |
| Io Note3 | dBm/9 MHz | -50 | -75.46 | -85.26 |
| $\hat{E}_s / N_{oc}$ | dB | -1.75 | -4.0 | -4.0 |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

**Table A.9.2.4A.2-2: RSRQ FDD—TDD Inter frequency test parameters (TDD cell2)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | - | - | - |
| Special subframe configuration Note1 | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | 1 | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | - | - | - |
| PDSCH allocation | $n_{PRB}$ | - | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | dBm/15 kHz | -80 | -104.70 | -114.50 |
| $\hat{E}_s / I_{ot}$ | dB | -1.75 | -4.0 | -4.0 |
| RSRP Note4 | dBm/15 kHz | -81.75 | -108.70 | -118.50 |
| RSRQ Note4 | dB | -14.76 | -16.25 | -16.25 |
| Io Note4 | dBm/9 MHz | -50 | -75.46 | -85.26 |
| $\hat{E}_s / N_{oc}$ | dB | -1.75 | -4.0 | -4.0 |
| Propagation condition | - | AWGN | AWGN | AWGN |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.2.4A.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in sections 9.1.6.1 and 9.1.6.2. The RSRQ measurement accuracy for UE Category 1bis shall fulfil the requirements in sections 9.1.6.5 and 9.1.6.6.

## A.9.2.5 FDD RSRQ for E-UTRA Carrier Aggregation

### A.9.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.5.2 Test parameters

In this test case the PCell and the SCell are on different carrier frequencies. There are three cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carrier are tested by using test parameters specified in Table A.9.2.5.2-1. In the test, Cell 1 is the PCell, Cell 2 is the SCell on the Secondary Component Carrier (SCC) and Cell 3 is the neighbouring cell on the SCC. The SCC is configured and activated.

**Table A.9.2.5.2-1: FDD RSRQ Carrier Aggregation test parameters**

| Parameters | | Test 1 | | | |
|---|---|---|---|---|---|
| | | Units | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | | 1 | 2 | 2 |
| $BW_{channel_CA}$ | | MHz | 10 | 10 | 10 |
| Timeing offset to Cell 1 | | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.6FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note1] | | | | | |
| OCNG_RB[Note1] | | | | | |
| $N_{oc}$ [Note2] | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -119 | -115.5 | -115.5 |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F Note 6 | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| $\hat{E}_s/I_{ot}$ | | dB | -4.0 | -5.46 | -5.46 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -123.5 | -120 | -120 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -123 | -119.5 | -119.5 |
| | Bands FDD_C | | -122.5 | -119 | -119 |
| | Bands FDD_D | | -122 | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 6 | | -121.5 | -118 | -118 |
| | Bands FDD_G | | -120.5 | -117 | -117 |
| | Bands FDD_H | | -120 | -116.5 | -116.5 |
| RSRQ Note3 | Bands FDD_A | dB | -16.25 | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A | dBm/9 MHz | -90.26 | -85.67 | -85.67 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -89.76 | -85.17 | -85.17 |
| | Bands FDD_C | | -89.26 | -84.67 | -84.67 |
| | Bands FDD_D | | -88.76 | -84.17 | -84.17 |
| | Bands FDD_E, FDD_F Note 6 | | -88.26 | -83.67 | -83.67 |
| | Bands FDD_G | | -87.26 | -82.67 | -82.67 |
| | Bands FDD_H | | -86.76 | -82.17 | -82.17 |
| $\hat{E}_s/N_{oc}$ | | dB | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.5.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.6 TDD RSRQ for E-UTRA Carrier Aggregation

The test case in this clause are applicable to carrier aggregation capable UEs which have been configured with a downlink Scell.

### A.9.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRQ measurement accuracy in carrier aggregation is within the specified limits in a synchronized network environment with AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier defined in Clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier defined in Clause 9.1.11.2, and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers defined in Clause 9.1.11.3.

### A.9.2.6.2 Test parameters

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is PCell, Cell 2 is SCell, and Cell 3 is the target cell. PCell and SCell are in different RF channels. Cell 3 is in the same RF channel as Cell 2. The parameters for the test are listed in Table A.9.2.6.2-1.

**Table A.9.2.6.2-1: TDD RSRQ test parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | | |
| Timing offset to cell 1 | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink-downlink configuration[Note1] | | 1 | | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB<br>OCNG_RA[Note2]<br>OCNG_RB[Note2] | | | | | |
| $N_{OC}$ [Note3] | Bands TDD_A | dBm/15 kHz | -119.5 | -116 | |
| | Bands TDD_C | | -118.5 | -115 | |
| | Bands TDD_E | | -117.5 | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | -4.0 | -5.46 | -5.46 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -123.50 | -120 | -120 |
| | Bands TDD_C | | -122.50 | -119 | -119 |
| | Bands TDD_E | | -121.50 | -118 | -118 |
| RSRQ[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | -16.25 | -17.34 | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -90.26 | -85.67 | |
| | Bands TDD_C | | -89.26 | -84.67 | |
| | Bands TDD_E | | -88.26 | -83.67 | |
| $\hat{E}_s / N_{oc}$ | | dB | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.6.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in section 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.2.7 FDD RSRQ under Time Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.9.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction is within the specified limits. This test will verify the requirements in Clause 9.1.5.2 for FDD intra frequency measurements under time domain measurement resource restriction.

### A.9.2.7.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurements under time domain measurement resource restriction is tested by using the parameters in Table A.9.2.7.2-1 and Table A.9.2.7.2-2 for non-MBSFN ABS with non-colliding CRS. In all test cases, Cell 1 is the serving cell and also the aggressor cell to Cell 2. Cell 2 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.2.7.2-1: General test parameters for E-UTRAN FDD RSRQ intra frequency test parameters under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 2 |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 µs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})mod6 != 0$ | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met. |
| ABS pattern | | '10000000100000001000000010000000010000000' | Non-MBSFN ABS. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are cofigured in the ABS subframes in Cell 1. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '10000000100000001000000010000000010000000' | Configured for Cell 2 measurements by measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '01000000010000000100000001000000001000000' | Configured for measurements on Cell 1. |

**Table A.9.2.7.2-2: Cell-specific test parameters for E-UTRAN FDD RSRQ intra frequency test parameters under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and A.3.2.1.6 (OP.6 FDD) | | OP.5 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD |
| PBCH_RA | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PBCH_RB | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | | | | | | | |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A Note 10 | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -114 | |
| | Bands FDD_G Note 9 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -2 | 5 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | 2.88 | -2.00 | 2.88 | -2.00 | 3.54 | -4.00 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -1.12 | -5.54 | -0.46 | -7.54 |
| RSRP Note3,4,5 | Bands FDD_A Note 10 | dBm/15 kHz | -79.76 | -86.76 | -98.85 | -105.85 | -111 | -120 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -110.5 | -119.5 |
| | Bands FDD_C | | | | | | -110 | -119 |
| | Bands FDD_D | | | | | | -109.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -109 | -118 |
| | Bands FDD_G Note 9 | | | | | | -108 | -117 |
| | Bands FDD_H | | | | | | -107.5 | -116.5 |
| $(\mathrm{RSRQ})_{meas}$ Note3,4,5 | Bands FDD_A Note 10, FDD_B1, FDD_B2 Note 11, FDD_C, FDD_E, FDD_F Note 7, FDD_G Note 9, FDD_H | dB | -12.60 | -15.30 | -12.60 | -15.30 | -12.38 | -16.69 |
| $(\mathrm{Io})_{meas}$ Note3 | Bands FDD_A Note 10 | dBm/9 MHz | -50.17 | -53.64 | -69.26 | -72.73 | -81.63 | -85.37 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | -81.13 | -84.87 |
| | Bands FDD_C | | | | | | -80.63 | -84.37 |
| | Bands FDD_D | | | | | | -80.13 | -83.87 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | -79.63 | -83.37 |
| | Bands FDD_G Note 9 | | | | | | -78.63 | -82.37 |
| | Bands FDD_H | | | | | | -78.13 | -81.87 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes of the respective cell.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: Except Band 29.
Note 10: Except Band 32, Band 75, Band 76.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.9.2.7.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.5.2.

### A.9.2.8 TDD RSRQ under Time Domain Measurement Resource Restriction with Non-MBSFN ABS

#### A.9.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction is within the specified limits. This test will verify the requirements in Clause 9.1.5.2 for TDD intra frequency measurements under time domain measurement resource restriction.

#### A.9.2.8.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurements under time domain measurement resource restriction is tested by using the parameters in Table A.9.2.8.2-1 and Table A.9.2.8.2-2 for non-MBSFN ABS with non-colliding CRS. In all test cases, Cell 1 is the serving cell and also the aggressor cell to Cell 2. Cell 2 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.2.8.2-1: General test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | Also the aggressor cell. |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| Special subframe configuration | | 6 | For Cell 1 and Cell 2. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |
| Physical cell ID PCI | | $(PCI_{cell1} - PCI_{cell2})\bmod 6 \neq 0$ | Cell PCIs for Cell 1 and Cell 2 are randomly selected so that the condition is met |

| | | | |
|---|---|---|---|
| ABS pattern | | '00000000010000000001' | Non-MBSFN ABS. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1.<br>The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are cofigured in the ABS subframes in Cell 1. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00000000010000000001' | Configured for Cell 2 measurements by measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000001000000000' | Configured for Cell 1 measurements. |

**Table A.9.2.8.2-2: Cell-specific test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time domain measurement resource restriction with non-MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note2 | Bands TDD_A | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -2 | 5 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | 2.88 | -2.00 | 2.88 | -2.00 | 3.54 | -4.00 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -1.12 | -5.54 | -0.46 | -7.54 |
| RSRP Note3,4,5 | Bands TDD_A | dBm/15 kHz | -79.76 | -86.76 | -98.85 | -105.85 | -111 | -120 |
| | Bands TDD_C | | | | | | -110 | -119 |
| | Bands TDD_E | | | | | | -109 | -118 |
| $(\mathrm{RSRQ})_{meas}$ Note3,4,5 | Bands TDD_A, TDD_C, TDD_E | dB | -12.60 | -15.30 | -12.60 | -15.30 | -12.38 | -16.70 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $(Io)_{meas}$ Note3 | Bands TDD_A | dBm/9 MHz | -50.17 | -53.64 | -69.26 | -72.73 | -81.63 | -85.37 |
| | Bands TDD_C | | | | | | -80.63 | -84.37 |
| | Bands TDD_E | | | | | | -79.63 | -83.37 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Applies to restricted measurement subframes of the respective cell.

Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.

Note 7: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.8.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.5.2.

## A.9.2.9 FDD RSRQ under Time Domain Measurement Resource Restriction with MBSFN ABS

### A.9.2.9.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction is within the specified limits under AWGN propagation conditions. This test will verify the absolute FDD RSRQ accuracy under time domain measurement resource restriction specified in Clause 9.1.5.2.

### A.9.2.9.2 Test parameters

The test parameters are given in Tables A.9.2.9.2-1 and A.9.2.9.2-2 below. In this test case there are two cells on the same frequency used in this test case. In the test, Cell 1 is the serving cell and also the aggressor cell to Cell 2. Cell 2 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured by higher layers with a time domain measurement restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.2.9.2-1: General test parameters for FDD RSRQ under time domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| Serving cell (PCell) | | Cell 1 | Also the aggressor cell on E-UTRA RF channel number 1 |
| Neighbour cell | | Cell 2 | Cell to be identified on E-UTRA RF channel number 1 |
| PCell ABS configuration | | MBSFN ABS | As defined in Table A.3.4.2.1-1 |
| CP length | | Normal | |
| DRX | | OFF | |
| Time offset between cells | | 3 μs | Synchronous cells |

| | | | |
|---|---|---|---|
| Physical cell ID PCI | | ($PCI_{cell1}$ - $PCI_{cell2}$ ) mod 6 = 0, $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs are selected so that the condition is met (colliding CRS) |
| Cell 1 MBSFN ABS pattern | | '01000000100000001000000000010000000 1000000' | ABS subframe is only MBSFN subframe. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. Configured in Cell 1. |
| Time domain measurement resource restriction pattern for PCell (Cell 1) measurements on RF Channel 1 | | '00010000000100000001000000001000000 0000' | Time domain measurement resource restriction pattern for PCell measurement signalled to the UE in measSubframePatternPCell. The IE MeasSubframePattern is used to specify the time domain measurement resource restriction as defined in TS 36.331 [2], clause 6.3.6. Configured for Cell 1 measurements. |
| Time domain measurement resource restriction pattern for neighbour cell (Cell 2) measurements on RF Channel 1 | | '01000000100000001000000000010000000 1000000' | Time domain measurement resource restriction pattern for neighbour cell measurement signalled to the UE in measSubframePatternNeigh The IE MeasSubframePattern is used to specify the time domain measurement resource restriction as defined in TS 36.331 [2], clause 6.3.6. Configured for Cell 2 measurements. |

**Table A.9.2.9.2-2: Cell specific test parameters for FDD RSRQ under time domain measurement resource restriction with MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| OCNG Patterns defined in A.3.2.1.8 (OP.8 FDD) and A.3.2.1.6 (OP.6 FDD) Note5 | | | OP.8 FDD | OP.6 FDD | OP.8 FDD | OP.6 FDD | OP.8 FDD | OP.6 FDD |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note2 | Bands FDD_A Note 11 | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -115.5 | |
| | Bands FDD_C | | | | | | -115 | |
| | Bands FDD_D | | | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -114 | |
| | Bands FDD_G Note 10 | | | | | | -113 | |
| | Bands FDD_H | | | | | | -112.5 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -2 | 5 | -4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5, 7 in the 1st OFDM symbol | | dB | 2.88 | -8.19 | 2.88 | -8.19 | 3.54 | -10.19 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ note 5 in OFDM symbols 4,7,11 | | dB | 2.88 | -2 | 2.88 | -2 | 3.54 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -1.12 | -5.54 | -0.46 | -7.54 |
| RSRP Note 3,4,5 | Bands FDD_A Note 11 | dBm/15 kHz | -79.76 | -86.76 | -98.85 | -105.85 | -111 | -120 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -110.5 | -119.5 |
| | Bands FDD_C | | | | | | -110 | -119 |
| | Bands FDD_D | | | | | | -109.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -109 | -118 |
| | Bands FDD_G Note 10 | | | | | | -108 | -117 |
| | Bands FDD_H | | | | | | -107.5 | -116.5 |
| (RSRQ) *meas* Note 3,4,5 | Bands FDD_A Note 11 | dB | -12.60 | -15.02 | -12.60 | -15.02 | -12.38 | -16.36 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 8 | | | | | | | |
| | Bands FDD_G Note 10 | | | | | | | |
| | Bands FDD_H | | | | | | | |
| (Io) *meas* Note 3 1st OFDM symbol | Bands FDD_A Note 11 | dBm/9 MHz | -50.17 | -53.64 | -69.26 | -72.73 | -81.63 | -85.37 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -81.13 | -84.87 |
| | Bands FDD_C | | | | | | -80.63 | -84.37 |
| | Bands FDD_D | | | | | | -80.13 | -83.87 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -79.63 | -83.37 |
| | Bands FDD_G Note 10 | | | | | | -78.63 | -82.37 |
| | Bands FDD_H | | | | | | -78.13 | -81.87 |
| (Io) *meas* Note 3 OFDM symbols other than the 1st one | Bands FDD_A Note 11 | dBm/9 MHz | -50.17 | -54.85 | -69.26 | -73.94 | -81.63 | -86.76 |
| | Bands FDD_B1, FDD_B2 Note 12 | | | | | | -81.13 | -86.26 |
| | Bands FDD_C | | | | | | -80.63 | -85.76 |
| | Bands FDD_D | | | | | | -80.13 | -85.26 |
| | Bands FDD_E, FDD_F Note 8 | | | | | | -79.63 | -84.76 |
| | Bands FDD_G Note 10 | | | | | | -78.63 | -83.76 |
| | Bands FDD_H | | | | | | -78.13 | -83.26 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes of the respective cell.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.1-1.
Note 7: In the 1st OFDM symbol, Cell 2 is not expected to meet the Es/Iot side condition in 9.1.5.2.
Note 8: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Except Band 29.
Note 11: Except Band 32, Band 75, Band 76.
Note 12: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.9.3 Test Requirements

In the test, the RSRQ measurement accuracy under time domain measurement resource restriction shall fulfil the requirements in Clause 9.1.5.2

## A.9.2.10 TDD Intra frequency case under time domain measurement resource restriction with MBSFN ABS

### A.9.2.10.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction is within the specified limits. This test will verify the requirements in Clause 9.1.5.2 for TDD intra frequency measurements under time domain measurement resource restriction.

### A.9.2.10.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurements under time domain measurement resource restriction is tested by using the parameters in Table A.9.2.10.2-1 and Table A.9.2.10.2-2 for MBSFN ABS with colliding CRS. In all test cases, Cell 1 is the serving cell and also the aggressor cell to Cell 2. Cell 2 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells and provided with a neighbour cell list associated with the pattern, where the cell list includes Cell 2. The UE is also configured with a time-domain measurement resource restriction pattern for the serving cell measurements. The information for both patterns shall be provided to the UE before the measurements start.

**Table A.9.2.10.2-1: General test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time-domain measurement resource restriction with MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The aggressor cell to Cell 2 |
| Neighbour cell | | Cell 2 | Cell to be measured |
| PCell ABS configuration | | MBSFN ABS | As defined in Table A.3.4.2.1-1 |
| Special subframe configuration | | 6 | For Cell 1 and Cell 2. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| CP length | | Normal | For both cells in the test |
| DRX | | | OFF |
| Time offset between cells | | 3 μs | Synchronous cells |

| | | | |
|---|---|---|---|
| Physical cell ID PCI | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 =0 $PCI_{cell1}$ not equal to $PCI_{cell2}$ | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met |
| ABS pattern | | '00001000000000100000' | MBSFN ABS pattern. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 1.<br>The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. All ABS subframes are MBSFN subframes. |
| Time-domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00001000000000100000' | Configured for Cell 2 measurements by measSubframePattern-Neigh IE in measSubframePatternConfig-Neigh, as defined in TS 36.331 [2], clause 6.3.5. measSubframeCellList contains Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000001000000000' | Configured for measurements on Cell 1. |

**Table A.9.2.10.2-2: Cell-specific test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time domain measurement resource restriction with MBSFN ABS**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.5 (OP.5 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.5 TDD | OP.2 TDD | OP.5 TDD | OP.2 TDD | OP.5 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | dB | Note 6 | 0 | Note 6 | 0 | Note 6 | 0 |
| PSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| SSS_RA | | dB | -4 | 0 | -4 | 0 | -4 | 0 |
| $N_{oc}$ Note2 | Bands TDD_A | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands TDD_C | | | | | | -115 | |
| | Bands TDD_E | | | | | | -114 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | -2 | 5 | -2 | 5 | -4 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ Note 5, 7 In the 1st OFDM symbol | | dB | 2.88 | -8.19 | 2.88 | -8.19 | 3.54 | -10.19 |
| CRS $\left(\hat{E}_s / Iot\right)_{meas}$ Note 5 in OFDM symbols 4,7,11 | | dB | 2.88 | -2 | 2.88 | -2 | 3.54 | -4 |
| SCH $\hat{E}_s / I_{ot}$ | | dB | -1.12 | -5.54 | -1.12 | -5.54 | -0.46 | -7.54 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RSRP Note 3,4,5 | Bands TDD_A | dBm/15 kHz | -79.76 | -86.76 | -98.85 | -105.85 | -111 | -120 |
| | Bands TDD_C | | | | | | -110 | -119 |
| | Bands TDD_E | | | | | | -109 | -118 |
| $(\mathrm{RSRQ})_{meas}$ Note 3,4,5 | Bands TDD_A, TDD_C, TDD_E | dB | -12.60 | -15.02 | -12.60 | -15.02 | -12.38 | -16.36 |
| $(\mathrm{Io})_{meas}$ Note 3 in the 1st OFDM symbol | Bands TDD_A | dBm/9 MHz | -50.17 | -53.64 | -69.26 | -72.73 | -81.63 | -85.37 |
| | Bands TDD_C | | | | | | -80.63 | -84.37 |
| | Bands TDD_E | | | | | | -79.63 | -83.37 |
| $(\mathrm{Io})_{meas}$ Note 3 in OFDM symbols other than the 1st one | Bands TDD_A | dBm/9 MHz | -50.17 | -54.85 | -69.26 | -73.94 | -81.63 | -86.76 |
| | Bands TDD_C | | | | | | -80.63 | -85.76 |
| | Bands TDD_E | | | | | | -79.63 | -84.76 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes of the respective cell.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.2.1-1.
Note 7: In the 1st OFDM symbol, Cell 2 is not expected to meet the Es/Iot side condition in 9.1.5.2.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.10.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in clause 9.1.5.2.

## A.9.2.11 FDD RSRQ for E-UTRA Carrier Aggregation (20MHz bandwidth)

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.11.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.5.1.

### A.9.2.11.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.5.2 except that the values of the parameters in the Table A.9.2.11.2-1 will replace the values of the corresponding parameters in A.9.2.5.2-1.

**Table A.9.2.11.2-1: FDD RSRQ Carrier Aggregation test parameters**

| Parameters | Test 1 | | | |
|---|---|---|---|---|
| | Units | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note 1 | MHz | 20 | 20 | 20 |
| Measurement bandwidth | $n_{PRB}$ | 47-52 | 47-52 | 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.4 FDD | R.4 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 38-61 | 38-61 | - |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.10 FDD | R.10 FDD | R.10 FDD |
| OCNG Patterns defined in A.3.2.1.11 (OP.11 FDD) and A.3.2.1.12 (OP.12 FDD) | | | OP.11 FDD | OP.11 FDD | OP.12 FDD |
| $Io^{Note2}$ | Bands FDD_A Note 5 | dBm/18 MHz | -87.26 | -82.67 | |
| | Bands FDD_B1 Note 5 , FDD_B2 Note 5 Note 6 | | -86.76 | -82.17 | |
| | Bands FDD_C Note 5 | | -86.26 | -81.67 | |
| | Bands FDD_D Note 5 | | -85.76 | -81.17 | |
| | Bands FDD_E Note 5 | | -85.26 | -80.67 | |
| | Bands FDD_G Note 5 | | -84.26 | -79.67 | |
| | Bands FDD_H Note 5 | | -83.76 | -79.17 | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves
Note 3: See Table A.9.2.5.2-1 for the other parameters
Note 4: E-UTRA operating band groups are as defined in Section 3.5.
Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 20 MHz channel bandwidth.
Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.11.3 Test Requirements

The test requirements defined in section A.9.2.5.3 shall apply in this test case.

## A.9.2.12 TDD RSRQ for E-UTRA Carrier Aggregation (20MHz bandwidth)

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.12.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.6.1.

### A.9.2.12.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.6.2 except that the values of the parameters in the Table A.9.2.12.2-1 will replace the values of the corresponding parameters in A.9.2.6.2-1.

**Table A.9.2.12.2-1: TDD RSRQ Carrier Aggregation test parameters**

| Parameters | Test 1 | | | |
|---|---|---|---|---|
| | Units | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note1 | MHz | 20 | 20 | 20 |
| Measurement bandwidth | $n_{PRB}$ | 47-52 | 47-52 | 47-52 |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.3 TDD | R.3 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 38-61 | 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.10 TDD | R.10 TDD | R.10 TDD |
| OCNG Patterns defined in A.3.2.2.7 (OP.7 TDD) and A.3.2.2.8 (OP.8 TDD) | | | OP.7 TDD | OP.7 TDD | OP.8 TDD |
| $Io^{Note2}$ | Bands TDD_A Note 5 | dBm/18 MHz | -87.26 | -82.67 | |
| | Bands TDD_C Note 5 | | -86.26 | -81.67 | |
| | Bands TDD_E Note 5 | | -85.26 | -80.67 | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves
Note 3: See Table A.9.2.6.2-1 for the other parameters.
Note 4: E-UTRA operating band groups are as defined in Section 3.5.
Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 20 MHz channel bandwidth.

### A.9.2.12.3 Test Requirements

The test requirements defined in section A.9.2.6.3 shall apply in this test case.

## A.9.2.13 Void

### A.9.2.13.1 Void

### A.9.2.13.2 Void

**Table A.9.2.13.2-1: Void**

### A.9.2.13.3 Void

## A.9.2.14 Void

### A.9.2.14.1 Void

### A.9.2.14.2 Void

**Table A.9.2.14.2-1: Void**

### A.9.2.14.3 Void

## A.9.2.15 FDD RSRQ under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.2.15.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction with CRS assistance information is within the specified limits. This test will verify the requirements in Clause 9.1.5.3 for FDD intra frequency measurements under time domain measurement resource restriction with CRS assistance information.

### A.9.2.15.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurements under time domain measurement resource restriction with CRS assistance information is tested by using the parameters in Table A.9.2.15.2-1 and Table A.9.2.15.2-2 for non-MBSFN ABS with colliding CRS between Cell1 and Cell3 and non-colliding CRS between Cell1 and Cell2. In all test cases, Cell 1 is the serving/aggressor cell, Cell2 is the neighbour/aggressor cell and Cell3 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell 1 with a time domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on neighbour cells, namely Cell 3 measurements with a neighbour cell list, where the cell list includes Cell 3. The UE is also provided via higher layers with the CRS assistance information of Cell 2. The information for both measurement pattern and the CRS assistance information shall be provided to the UE before the measurements start.

Note: It's up to eNB's implementation whether the time domain measurement resource restriction pattern for PCell measurements is configured or not.

**Table A.9.2.15.2-1: General test parameters for E-UTRAN FDD RSRQ intra frequency test parameters under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| PCell | | | Cell 1 | Serving/aggressor cell |
| Neighbour cells | | | Cell 2 | Neighbour/aggressor cell |
| | | | Cell3 | Cell to be measured |
| ABS transmission configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | | Normal | For all cells in the test |
| DRX | | | | OFF |
| Time offset between cells | | µs | Cell 2 offset with respect to Cell 1: 0<br>Cell 3 offset with respect to Cell 1: -2.5 | Three synchronous cells |
| Physical cell IDs | | | $(PCI_{cell1} - PCI_{cell3})mod6 = 0$<br>$(PCI_{cell2} - PCI_{cell3})mod6 != 0$<br>$PCI_{cell1}$ not equal to $PCI_{cell3}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | | '10000000100000001000000010000000010000000' | FDD ABS Pattern Info IE, as defined in TS 36.423[28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Configured in Cell 1 and Cell 2. |
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | | '10000000100000001000000010000000010000000' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5.<br>Configured for Cell 3 measurements. The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | | '01000000010000000100000001000000010000000' | Configured for measurements on Cell 1. |
| CRS assistance information | physCellId | | see PCI conditions above | Only the CRS information of cell 2 is provided in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *oneFrame*='000000'. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.9.2.15.2-2: Cell-specific test parameters for E-UTRAN FDD RSRQ intra frequency test parameters under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | | Unit | Test 1 | | | Test 2 | | | Test 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | | 22—27 | | | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | | R.0 FDD | - | | R.0 FDD | - | |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | | 13—36 | - | | 13—36 | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | | R.6 FDD | | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and A.3.2.1.6 (OP.6 FDD) | | | OP.5 FDD | OP.6 FDD | OP.6 FDD | OP.5 FDD | OP.6 FDD | OP.6 FDD | OP.5 FDD | OP.6FDD | OP.6 FDD |
| PBCH_RA | | dB | Note 6 | 0 | | Note 6 | 0 | | Note 6 | 0 | |
| PBCH_RB | | | | | | | | | | | |
| PSS_RA | | | | | | | | | | | |
| SSS_RA | | | | | | | | | | | |
| PCFICH_RB | | | | | | | | | | | |
| PHICH_RA | | | | | | | | | | | |
| PHICH_RB | | | | | | | | | | | |
| PDCCH_RA | | | | | | | | | | | |
| PDCCH_RB | | | | | | | | | | | |
| PDSCH_RA | | | | | | | | | | | |
| PDSCH_RB | | | | | | | | | | | |
| OCNG_RA Note 1 | | | | | | | | | | | |
| OCNG_RB Note 1 | | | | | | | | | | | |
| $N_{oc}$ Note 2 | Bands FDD_A Note 10 | dBm/ 15 kHz | -84.76 | | | -103.85 | | | -116 | | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | -115.5 | | |
| | Bands FDD_C | | | | | | | | -115 | | |
| | Bands FDD_D | | | | | | | | -114.5 | | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -114 | | |
| | Bands FDD_G Note 9 | | | | | | | | -113 | | |
| | Bands FDD_H | | | | | | | | -112.5 | | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 4 | 2 | -1.5 | 4 | 2 | -1.5 | 4 | 2 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 5 | | dB | -1.18 | -0.32 | -6.96 | -1.18 | -0.32 | -6.96 | -0.75 | 0.54 | -9.46 |
| RSRP Note 3,4,5 | Bands FDD_A Note 10 | dBm/ 15 kHz | -80.76 | -82.76 | -86.26 | -99.85 | -101.85 | -105.35 | -112 | -114 | -120 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | 111.5 | 113.5 | 119.5 |
| | Bands FDD_C | | | | | | | | -111 | -113 | -119 |
| | Bands FDD_D | | | | | | | | 110.5 | 112.5 | 118.5 |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -110 | -112 | -118 |
| | Bands FDD_G Note 9 | | | | | | | | -109 | -111 | -117 |
| | Bands FDD_H | | | | | | | | 108.5 | 110.5 | 116.5 |
| $(RSRQ)_{meas}$ Note 3,4,5 | Bands FDD_A Note 10, FDD_B1, FDD_B2 Note 11, | dB | -14.43 | -11.59 | -15.09 | -14.43 | -11.59 | -15.09 | -14.19 | -10.81 | -16.81 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FDD_C, FDD_D, FDD_E, FDD_F Note 7, FDD_G Note 9, FDD_H | | | | | | | | | | |
| $(Io)_{meas}$ Note 3 | Bands FDD_A Note 10 | dBm/ 9 MHz | -49.34 | -53.19 | | -68.43 | -72.28 | | -80.82 | -85.03 | |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | | | | -80.32 | -84.54 | |
| | Bands FDD_C | | | | | | | | -79.82 | -84.04 | |
| | Bands FDD_D | | | | | | | | -79.32 | -83.54 | |
| | Bands FDD_E, FDD_F Note 7 | | | | | | | | -78.82 | -83.04 | |
| | Bands FDD_G Note 9 | | | | | | | | -77.82 | -82.04 | |
| | Bands FDD_H | | | | | | | | -77.32 | -81.54 | |
| Propagation condition | | - | AWGN | | | AWGN | | | AWGN | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes for only Cell 2 and Cell 3. For Cell 1, the corresponding value is derived from the normal subframes other than the subframes indicated in the time domain measurement resource restriction pattern for intra-frequency measurements.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.
Note 7: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: Except Band 29.
Note 10: Except Band 32, Band 75, Band 76.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.15.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.5.3.

## A.9.2.16 TDD RSRQ under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.2.16.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy under time domain measurement resource restriction with CRS assistance information is within the specified limits. This test will verify the requirements in Clause 9.1.5.3 for TDD intra frequency measurements under time domain measurement resource restriction with CRS assistance information.

### A.9.2.16.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurements under time domain measurement resource restriction with CRS assistance information is tested by using the parameters in Table A.9.2.16.2-1 and Table A.9.2.16.2-2 for non-MBSFN ABS with colliding CRS between Cell1 and Cell3 and non-colliding CRS between Cell1 and Cell2. In all test cases, Cell 1 is the serving/aggressor cell, Cell2 is the neighbour/aggressor cell and Cell3 is the target cell to be measured for RSRQ.

The UE is configured by higher layers via Cell1 with a time domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on neighbour cells, namely Cell 3 measurements with a neighbour cell list, where the cell list includes Cell 3. The UE is also provided via higher layers with the CRS assistance information of Cell 2. The information for both measurement pattern and the CRS assistance information shall be provided to the UE before the measurements start.

Note: It's up to eNB's implementation whether the time domain measurement resource restriction pattern for PCell measurements is configured or not.

**Table A.9.2.16.2-1: General test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCell | | Cell 1 | Serving/aggressor cell |
| Neighbour cells | | Cell 2 | Neighbour/aggressor cell |
| | | Cell3 | Cell to be measured |
| Special subframe configuration | | 6 | For Cell 1, Cell 2 and Cell 3. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1, Cell 2 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| ABS transmission configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| CP length | | Normal | For all cells in the test |
| DRX | | | OFF |
| Time offset between cells | μs | Cell 2 offset with respect to Cell 1: 0<br>Cell 3 offset with respect to Cell 1: -2.5 | Three synchronous cells |
| Physical cell IDs | | $(PCI_{cell1} - PCI_{cell3})mod6 = 0$<br>$(PCI_{cell2} - PCI_{cell3})mod6 != 0$<br>$PCI_{cell1}$ not equal to $PCI_{cell3}$ | Cell PCIs are selected so that all conditions are met |
| ABS pattern | | '00000000010000000001' | TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes.<br>Provided fto the UE for Cell 1 and Cell 2. |
| Time domain measurement resource restriction pattern for neighbour cell measurements on RF Channel 1 | | '00000000010000000001' | Time domain measurement resource restriction pattern for neighbor cell measurement signalled to the UE in measSubframePatternNeigh IE in measSubframePatternConfigNeigh, as defined in TS 36.331, clause 6.3.5.<br>Provided to the UE for Cell 3 measurements.<br>The cell list in measSubframeCellList IE shall contain Cell 3 but not Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000001000000000' | Configured for Cell 1 measurements. |

| | | | | |
|---|---|---|---|---|
| CRS assistance information | physCellId | | see PCI conditions above | Only the CRS assistance information of cell 2 is provided for Cell 2 only in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation *one Frame*='000000'. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.9.2.16.2-2: Cell-specific test parameters for E-UTRAN TDD RSRQ intra frequency test parameters under time domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | | Unit | Test 1 | | | Test 2 | | | Test 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | | 1 | | | 1 | | | 1 | | |
| $BW_{channel}$ | | MHz | 10 | | | 10 | | | 10 | | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | | 22—27 | | | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | | R.0 TDD | - | | R.0 TDD | - | |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | | 13—36 | - | | 13—36 | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | | | R.6 TDD | | | R.6 TDD | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | Note 6 | 0 | | Note 6 | 0 | | Note 6 | 0 | |
| $N_{oc}$ [Note2] | Bands TDD_A | dBm/15 kHz | -84.76 | | | -103.85 | | | -116 | | |
| | Bands TDD_C | | | | | | | | -115 | | |
| | Bands TDD_E | | | | | | | | -114 | | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 4 | 2 | -1.5 | 4 | 2 | -1.5 | 4 | 2 | -4 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ [Note 5] | | dB | -1.18 | -0.32 | -6.96 | -1.18 | -0.32 | -6.96 | -0.75 | 0.54 | -9.46 |
| RSRP[Note3,4,5] | Bands TDD_A | dBm/15 kHz | -80.76 | -82.76 | -86.26 | -99.85 | -101.85 | -105.35 | -112 | -114 | -120 |
| | Bands TDD_C | | | | | | | | -111 | -113 | -119 |
| | Bands TDD_E | | | | | | | | -110 | -112 | -118 |
| $(\mathrm{RSRQ})_{meas}$ Note3,4,5 | Bands TDD_A, TDD_C, TDD_E | dB | -14.43 | -11.59 | -15.09 | -14.43 | -11.59 | -15.09 | -14.19 | -10.81 | -16.81 |
| $(\mathrm{Io})_{meas}$ [Note3] | Bands TDD_A | dBm/9 MHz | -49.34 | -53.19 | | -68.43 | -72.28 | | -80.82 | -85.03 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands TDD_C | | | | | | -79.82 | -84.03 |
| | Bands TDD_E | | | | | | -78.82 | -83.04 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io levels are calculated in CRS symbols of measurement restricted subframes.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: Applies to restricted measurement subframes for only Cell 2 and Cell 3. For Cell 1, the corresponding value is derived from the normal subframes other than the subframes indicated in the time domain measurement resource restriction pattern for intra-frequency measurements.
Note 6: Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1.
Note 7: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.16.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.5.3.

## A.9.2.17 FDD Intra frequency case for 5 MHz bandwidth

### A.9.2.17.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.5.1.

### A.9.2.17.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.17.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.17.2-1: RSRQ FDD Intra frequency test parameters, 5MHz**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 5 | | 5 | | 5 | |
| Measurement bandwidth | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.5 FDD | - | R.5 FDD | - | R.5 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 7—17 | - | 7—17 | - | 7—17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.11 FDD | | R.11 FDD | | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | | | | | | | |
| $N_{oc}$ [Note2] | Bands FDD_N | dBm/15 kHz | -81.76 | | -100.85 | | -109.5 | |
| $\hat{E}_s / I_{ot}$ | | dB | -1.76 | -1.76 | -4.70 | -4.70 | -5.46 | -5.46 |
| RSRP[Note3] | Bands FDD_N | dBm/15 kHz | -78.76 | -78.76 | -103.75 | -103.75 | -113.50 | -113.50 |
| RSRQ[Note3] | Bands FDD_N | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| Io[Note3] | Bands FDD_N | dBm/4.5 MHz | -50.01 | | -73.01 | | -82.19 | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.2.17.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.5.1.

## A.9.2.18 FDD—FDD Inter frequency case for 5MHz bandwidth

### A.9.2.18.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6.1 and 9.1.6.2.

### A.9.2.18.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.18.2-1. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.18.2-1: RSRQ FDD—FDD Inter frequency test parameters, 5MHz**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | MHz | 5 | 5 | 5 | 5 | 5 | 5 |
| Gap Pattern Id | | 0 | - | 0 | - | 0 | - |
| Measurement bandwidth | $n_{PRB}$ | 10—15 | | 10—15 | | 10—15 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.5 FDD | - | R.5 FDD | - | R.6 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 7—17 | - | 7—17 | - | 7—17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.11 FDD | | R.11 FDD | | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD | OP.15 FDD | OP.16 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD_A | dBm/15 kHz | -77 | -77 | -101.70 | -101.70 | -119.5 | N/A |
| | Bands FDD_B1, FDD_B2 [Note 8] | | | | | | -119 | N/A |
| | Bands FDD_C | | | | | | -118.5 | N/A |
| | Bands FDD_D | | | | | | -118 | N/A |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | -117.5 | N/A |
| | Bands FDD_G | | | | | | -116.5 | N/A |
| | Bands FDD_H | | | | | | -116 | N/A |
| | Bands FDD_N | | | | | | - N/A | -113 |
| $\hat{E}_s/I_{ot}$ | | dB | -1.75 | -1.75 | -4.00 | -4.00 | -4.00 | -4.00 |
| RSRP[Note3] | Bands FDD_A | dBm/15 kHz | -78.75 | -78.75 | -105.70 | -105.70 | -123.5 | N/A |
| | Bands FDD_B1, FDD_B2 [Note 8] | | | | | | -123 | N/A |
| | Bands FDD_C | | | | | | -122.5 | N/A |
| | Bands FDD_D | | | | | | -122 | N/A |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | -121.5 | N/A |
| | Bands FDD_G | | | | | | -120.5 | N/A |
| | Bands FDD_H | | | | | | -120 | N/A |
| | Bands FDD_N | | | | | | N/A | -117 |
| RSRQ[Note3] | Bands FDD_A | dB | -14.76 | -14.76 | -16.25 | -16.25 | -16.25 | -16.25 |
| | Bands FDD_B1, FDD_B2 [Note 8] | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | | |
| | Bands FDD_G | | | | | | | |
| | Bands FDD_H | | | | | | | |
| | Bands FDD_N | | | | | | | |
| Io[Note3] | Bands FDD_A | dBm/4.5 MHz | -50.01 | -50.01 | -75.47 | -75.47 | -93.27 | N/A |
| | Bands FDD_B1, FDD_B2 [Note 8] | | | | | | -92.77 | N/A |
| | Bands FDD_C | | | | | | -92.27 | N/A |
| | Bands FDD_D | | | | | | -91.77 | N/A |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | -91.27 | N/A |
| | Bands FDD_G | | | | | | -90.27 | N/A |
| | Bands FDD_H | | | | | | -89.77 | N/A |
| | Bands FDD_N | | | | | | N/A | -86.77 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | -1.75 | -1.75 | -4.0 | -4.0 | -4.0 | -4.0 |
| Propagation condition | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: This test is only applicable for testing inter-frequency requirements for Bands FDD_N. Cell 2 is on the Band under test, and Cell 1 is on another band supported by the UE.
Note 7: E-UTRA operating band groups are as defined in Section 3.5.
Note 8: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.18.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Sections 9.1.6.1 and 9.1.6.2.

## A.9.2.19 FDD-FDD Inter Frequency WB-RSRQ

### A.9.2.19.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits when the measurement configuration message received by the UE contains *widebandRSRQ-Meas* parameter in TS 36.331 [2]. In the test the UE shall also be configured with the *AllowedMeasBandwidth* parameter defined in TS 36.331 [2]. The test shall verify the WB-RSRQ inter frequency absolute accuracy requirements defined in Section 9.1.6.3.

### A.9.2.19.2 Test parameters

In this test case the two cells are on two different carrier frequencies and measurement gaps are provided. The WB-RSRQ inter frequency absolute accuracy requirement is tested by using test parameters in Table A.9.2.19.2-1. In the test, Cell 1 is the PCell and Cell 2 the target cell on which the UE shall be ordered to measure WB-RSRQ.

**Table A.9.2.19.2-1: WB-RSRQ FDD-FDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Antenna Configuration | | 1x2 | 1x2 |
| Gap Pattern Id | | 0 | - |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | 0 |
| PSS_RA | | | 0 |
| SSS_RA | | | 0 |
| PCFICH_RB | | | -∞ |
| PHICH_RA | | | -∞ |
| PHICH_RB | | | -∞ |
| PDCCH_RA | | | -∞ |
| PDCCH_RB | | | -∞ |
| PDSCH_RA | | | -∞ |
| PDSCH_RB | | | -∞ |
| OCNG_RA[Note1] | | | -∞ |
| OCNG_RB[Note1] | | | -∞ |
| *AllowedMeasBandwidth* in TS 36.331 [2] | RB | 6 | 50 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH allocation | | $n_{PRB}$ | 13-36 | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | - | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | | OP.1 FDD | - | |
| $I_{ot}$ Note2 | bandwidth | $n_{PRB}$ | 0-49 | 0-21 28-49 | 22-27 |
| | | dBm/15 kHz | -94 | -87 | -110 |
| $\hat{E}_s / I_{ot}$ | bandwidth | $n_{PRB}$ | 0-49 | 0-21 28-49 | 22-27 |
| | | dB | -4 | -3 | 20 |
| RSRP Note3 | | dBm/15 kHz | -98 | -90 | |
| RSRQ Note3 | | dB | -16.25 | - | |
| WB-RSRQ$_0$ Note3 in subframe 0 | | dB | - | -13.68 | |
| WB-RSRQ$_1$ Note3 in subframe ≠ 0 | | dB | - | -13.63 | |
| Io Note3 | | dBm/ 9 MHz | -64.76 | - | |
| Io Note3 in symbol 0, 4, 11 of subframe 0 | | dBm/ 9 MHz | - | -82.38 | |
| Io Note3 in symbol 7 of subframe 0 | | dBm/ 9 MHz | - | -82.20 | |
| Io Note3 in symbol 0, 4, 7, 11 of subframes ≠ 0 | | dBm/ 9 MHz | - | -82.38 | |
| Propagation condition | | - | AWGN | AWGN | |

Note 1: OCNG shall be used such that Cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells not specified in the test, assumed to be constant over time and modelled as noise.
Note 3: RSRQ, RSRP, WB-RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The stated values represent the weighted average over the allowed measurement bandwidth, and the WB-RSRQ values assume averaging over symbols 0, 4, 7 and 11 of the subframe.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: This test case is applicable to all FDD frequency bands except bands within band group FDD_N.

### A.9.2.19.3 Test Requirements

The WB-RSRQ measurement accuracy for cell 2 shall fulfil the requirements in Section 9.1.6.3, compared with WB-RSRQ$_0$. or WB-RSRQ$_1$.

## A.9.2.20 TDD—TDD Inter Frequency WB-RSRQ

### A.9.2.20.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits when the measurement configuration message received by the UE contains *widebandRSRQ-Meas* parameter in TS 36.331 [2]. In the test the UE shall also be configured with the *AllowedMeasBandwidth* parameter defined in TS 36.331 [2]. The test shall verify the WB-RSRQ inter frequency absolute accuracy requirements defined in Section 9.1.6.3.

### A.9.2.20.2 Test parameters

In this test case the two cells are on two different carrier frequencies and measurement gaps are provided. The WB-RSRQ inter frequency absolute accuracy requirement is tested by using test parameters in Table A.9.2.20.2-1. In the test, Cell 1 is the PCell and Cell 2 the target cell on which the UE shall be ordered to measure WB-RSRQ.

**Table A.9.2.20.2-1: WB-RSRQ TDD-TDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | |
| E-UTRA RF Channel Number | | | 1 | 2 | |
| $BW_{channel}$ | | MHz | 10 | 10 | |
| Special subframe configuration Note1 | | | 6 | 6 | |
| Uplink-downlink configuration Note1 | | | 1 | 1 | |
| Antenna Configuration | | | 1x2 | 1x2 | |
| Gap Pattern Id | | | 0 | - | |
| PBCH_RA | | dB | 0 | 0 | |
| PBCH_RB | | | | 0 | |
| PSS_RA | | | | 0 | |
| SSS_RA | | | | 0 | |
| PCFICH_RB | | | | -∞ | |
| PHICH_RA | | | | -∞ | |
| PHICH_RB | | | | -∞ | |
| PDCCH_RA | | | | -∞ | |
| PDCCH_RB | | | | -∞ | |
| PDSCH_RA | | | | -∞ | |
| PDSCH_RB | | | | -∞ | |
| OCNG_RA Note2 | | | | -∞ | |
| OCNG_RB Note2 | | | | -∞ | |
| *AllowedMeasBandwidth* in TS 36.331 [2] | | RB | 6 | 50 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | - | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | - | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | | OP.1 TDD | - | |
| $I_{ot}$ Note3 | bandwidth | $n_{PRB}$ | 0-49 | 0-21<br>28-49 | 22-27 |
| | | dBm/15 kHz | -94 | -87 | -110 |
| $\hat{E}_s / I_{ot}$ | bandwidth | $n_{PRB}$ | 0—49 | 0-21<br>28-49 | 22-27 |
| | | dB | -4 | -3 | 20 |
| RSRP Note4 | | dBm/15 kHz | -98 | -90 | |
| RSRQ Note4 | | dB | -16.25 | - | |
| WB-$RSRQ_0$ Note4 in subframe 0 | | dB | - | -13.68 | |
| WB-$RSRQ_1$ Note4 in subframe ≠ 0 | | dB | - | -13.63 | |
| Io Note4 | | dBm/ 9 MHz | -64.76 | - | |
| Io Note4 in symbol 0, 4, 11 of subframe 0 | | dBm/ 9 MHz | - | -82.38 | |
| Io Note4 in symbol 7 of subframe 0 | | dBm/ 9 MHz | - | -82.20 | |
| Io Note4 in symbol 0, 4, 7, 11 of subframes ≠ 0 | | dBm/ 9 MHz | - | -82.38 | |
| Propagation condition | | - | AWGN | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that Cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells not specified in the test, assumed to be constant over time and modelled as noise.

Note 4: RSRQ, RSRP, WB-RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The stated values represent the weighted average over the allowed measurement bandwidth, and the WB-RSRQ values assume averaging over symbols 0, 4, 7 and 11 of the subframe.

| Note 5: | RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
|---|---|

### A.9.2.20.3 Test Requirements

The WB-RSRQ measurement accuracy for cell 2 shall fulfil the requirements in Section 9.1.6.3, compared with $WB\text{-}RSRQ_0$. or $WB\text{-}RSRQ_1$.

## A.9.2.21 FDD RSRQ for E-UTRAN Carrier Aggregation for 10MHz+5MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.21.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.5.1.

### A.9.2.21.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.5.2 except that the values of the parameters in the Table A.9.2.21.2-1 will replace the values of the corresponding parameters in A.9.2.5.2-1.

**Table A.9.2.21.2-1: FDD RSRQ Carrier Aggregation test parameters**

| Parameters | | Test 1 | | | |
|---|---|---|---|---|---|
| | | Units | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note 1 | | MHz | 10 | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | 10-15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.5 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | 7-17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.11 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD), A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | | OP.1 FDD | OP.15 FDD | OP.16 FDD |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 4 | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| | Bands FDD_N | | N/A | -109.5 | -109.5 |
| RSRP Note2 | Bands FDD_A | dBm/15 kHz | -123.5 | -120 | -120 |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_B1, FDD_B2 Note 4 | | -123 | -119.5 | -119.5 |
| | Bands FDD_C | | -122.5 | -119 | -119 |
| | Bands FDD_D | | -122 | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F | | -121.5 | -118 | -118 |
| | Bands FDD_G | | -120.5 | -117 | -117 |
| | Bands FDD_H | | -120 | -116.5 | -116.5 |
| | Bands FDD_N | | N/A | -113.5 | -113.5 |
| RSRQ Note2 | Bands FDD_A | dB | -16.25 | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2 Note 4 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| | Bands FDD_N | | | | |
| Io Note2 | Bands FDD_A | dBm/9MHz | -90.26 | N/A | |
| | Bands FDD_B1, FDD_B2 Note 4 | | -89.76 | | |
| | Bands FDD_C | | -89.26 | | |
| | Bands FDD_D | | -88.76 | | |
| | Bands FDD_E, FDD_F | | -88.26 | | |
| | Bands FDD_G | | -87.26 | | |
| | Bands FDD_H | | -86.76 | | |
| | Bands FDD_A | dBm/4.5MHz | N/A | -88.67 | |
| | Bands FDD_B1, FDD_B2 Note 4 | | | -88.17 | |
| | Bands FDD_C | | | -87.67 | |
| | Bands FDD_D | | | -87.17 | |
| | Bands FDD_E, FDD_F | | | -86.67 | |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_G | | | -85.67 |
| | Bands FDD_H | | | -85.17 |
| | Bands FDD_N | | | -82.17 |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.<br>Note 2: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 3: See Table A.9.2.5.2-1 for the other parameters<br>Note 4: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. | | | | |

### A.9.2.21.3 Test Requirements

The test requirements defined in section A.9.2.5.3 shall apply in this test case.

## A.9.2.22 TDD RSRQ for E-UTRAN Carrier Aggregation for 10MHz+5MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.22.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.6.1.

### A.9.2.22.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.6.2 except that the values of the parameters in the Table A.9.2.22.2-1 will replace the values of the corresponding parameters in A.9.2.6.2-1.

**Table A.9.2.22.2-1: TDD RSRQ Carrier Aggregation test parameters**

| Parameters | | Test 1 | | | |
|---|---|---|---|---|---|
| | | Units | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note1 | | MHz | 10 | 5 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | 10-15 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | R.4TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | 7-17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.11 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD), A.3.2.2.9 (OP.9 TDD) and A.3.2.2.10 (OP.10 TDD) | | | OP.1 TDD | OP.9 TDD | OP.10 TDD |
| $Io^{Note2}$ | Bands TDD_A | dBm/9MHz | -90.26 | N/A | |
| | Bands TDD_C | | -89.26 | | |
| | Bands TDD_E | | -88.26 | | |
| | Bands TDD_A | dBm/4.5MHz | N/A | -88.67 | |
| | Bands TDD_C | | | -87.67 | |
| | Bands TDD_E | | | -86.67 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |

| | |
|---|---|
| Note 2: | Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves |
| Note 3: | See Table A.9.2.6.2-1 for the other parameters |

### A.9.2.22.3 Test Requirements

The test requirements defined in section A.9.2.6.3 shall apply in this test case.

## A.9.2.23 FDD RSRQ for E-UTRA Carrier Aggregation (5MHz + 5MHz bandwidth)

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.23.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.5.1.

### A.9.2.23.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.5.2 except that the values of the parameters in the Table A.9.2.23.2-1 will replace the values of the corresponding parameters in A.9.2.5.2-1.

**Table A.9.2.23.2-1: FDD RSRQ Carrier Aggregation test parameters**

| Parameters | | Test 1 | | | |
|---|---|---|---|---|---|
| | | Units | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note 1 | | MHz | 5 | 5 | 5 |
| Measurement bandwidth | | $n_{PRB}$ | 10-15 | 10-15 | 10-15 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.5 FDD | R.5 FDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 7-17 | 7-17 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.11 FDD | R.11 FDD | R.11 FDD |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) and A.3.2.1.16 (OP.16 FDD) | | | OP.15 FDD | OP.15 FDD | OP.16FDD |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 6 | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| | Bands FDD_N | | -113 | -109.5 | -109.5 |
| RSRP Note2 | Bands FDD_A | dBm/15 kHz | -123.5 | -120 | -120 |
| | Bands FDD_B1, FDD_B2 Note 6 | | -123 | -119.5 | -119.5 |
| | Bands FDD_C | | -122.5 | -119 | -119 |
| | Bands FDD_D | | -122 | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F | | -121.5 | -118 | -118 |
| | Bands FDD_G | | -120.5 | -117 | -117 |
| | Bands FDD_H | | -120 | -116.5 | -116.5 |
| | Bands FDD_N | | -117 | -113.5 | -113.5 |

| | | | | | |
|---|---|---|---|---|---|
| RSRQ Note2 | Bands FDD_A | dB | -16.25 | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2 Note 6 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| | Bands FDD_N | | | | |
| Io Note2 | Bands FDD_A Note 5 | dBm/4.5MHz | -93.26 | -88.67 | |
| | Bands FDD_B1 Note 5,FDD_B2 Note 5 Note 6 | | -92.76 | -88.17 | |
| | Bands FDD_C Note 5 | | -92.26 | -87.67 | |
| | Bands FDD_D | | -91.76 | -87.17 | |
| | Bands FDD_E, FDD_F Note 5 | | -91.26 | -86.67 | |
| | Bands FDD_G Note 5 | | -90.26 | -85.67 | |
| | Bands FDD_H Note 5 | | -89.76 | -85.17 | |
| | Bands FDD_N Note 5 | | -86.76 | -82.76 | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: See Table A.9.2.5.2-1 for the other parameters
Note 4: E-UTRA operating band groups are as defined in Section 3.5.
Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 5MHz + 5MHz channel bandwidth.
Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.23.3 Test Requirements

The test requirements defined in section A.9.2.5.3 shall apply in this test case.

## A.9.2.24 TDD RSRQ for E-UTRA Carrier Aggregation (5MHz + 5MHz bandwidth)

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.24.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.6.1.

### A.9.2.24.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.6.2 except that the values of the parameters in the Table A.9.2.24.2-1 will replace the values of the corresponding parameters in A.9.2.6.2-1.

**Table A.9.2.24.2-1: TDD RSRQ Carrier Aggregation test parameters**

| Parameters | Test 1 |
|---|---|

| | | Units | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| $BW_{channel_CA}$ Note1 | | MHz | 10 | 5 | 5 |
| Measurement bandwidth | | $n_{PRB}$ | 10-15 | 10-15 | 10-15 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 TDD | R.4 TDD | N/A |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | 7-17 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.11 TDD | R.11 TDD |
| OCNG Patterns defined in A.3.2.2.9 (OP.9 TDD) and A.3.2.2.10 (OP.10 TDD) | | | OP.1 TDD | OP.9 TDD | OP.10 TDD |
| Io Note2 | Bands TDD_A Note 5 | dBm4.5MHz | -93.26 | -88.67 | |
| | Bands TDD_C Note 5 | | -92.26 | -87.67 | |
| | Bands TDD_E Note 5 | | -91.26 | -86.67 | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | | | |
| Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| Note 3: See Table A.9.2.6.2-1 for the other parameters | | | | | |
| Note 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |
| Note 5: The test applies for E-UTRA operating bands in this band group which are supporting 5MHz + 5MHz channel bandwidth. | | | | | |

### A.9.2.24.3 Test Requirements

The test requirements defined in section A.9.2.6.3 shall apply in this test case.

## A.9.2.25 RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD

The test case in this section are applicable to TDD-FDD carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.25.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of RSRQ measurements for the primary component carrier defined in clause 9.1.11.1, the absolute accuracy of RSRQ measurements for the secondary component carrier defined in clause 9.1.11.2, and also the relative RSRQ accuracy requirement between primary and secondary component carriers defined in clause 9.1.11.3.

### A.9.2.25.2 Test parameters

In this test case the PCell is FDD and SCell is TDD. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carrier are tested by using test parameters specified in Table A.9.2.25.2-1. In the test, Cell 1 is the PCell, Cell 2 is the SCell on the Secondary Component Carrier (SCC). The SCC is configured and activated.

The parameters of this test are given in Table A.9.2.25.2-1.

**Table A.9.2.25.2-1: RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD test parameters**

| Parameter | | Unit | Cell 1 | Cell 2 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 |
| $BW_{channel}$ | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | | - | 6 |
| Uplink-downlink configuration[Note1] | | | - | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | - | -116 |
| | Bands TDD_C | | - | -115 |
| | Bands TDD_E | | - | -114 |
| | Bands FDD_A | | -119.5 | - |
| | Bands FDD_B1, FDD_B2 [Note 11] | | -119 | - |
| | Bands FDD_C | | -118.5 | - |
| | Bands FDD_D | | -118 | - |
| | Bands FDD_E, Bands FDD_F [Note 6] | | -117.5 | - |
| | Bands FDD_G | | -116.5 | - |
| | Bands FDD_H | | -116 | - |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | - | -122 |
| | Bands TDD_C | | - | -121 |
| | Bands TDD_E | | - | -120 |
| | Bands FDD_A | | -125.5 | - |
| | Bands FDD_B1, FDD_B2 [Note 11] | | -123 | - |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_C | | -124.5 | - |
| | Bands FDD_D | | -124 | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | - |
| | Bands FDD_G | | -122.5 | - |
| | Bands FDD_H | | -122 | - |
| RSRQ Note4 | Bands TDD_A | dB | - | -17.77 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | -17.77 | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io Note4 | Bands TDD_A | $dBm/BW_{channel}$ | -87.25 + $10\log(N_{RB,c}/50)$ | - |
| | Bands TDD_C | | -86.25 + $10\log(N_{RB,c}/50)$ | - |
| | Bands TDD_E | | -85.25 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_A | | -90.75 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | 89.76 | - |
| | Bands FDD_C | | -89.75 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_D | | -89.25 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_G | | -87.75 + $10\log(N_{RB,c}/50)$ | - |
| | Bands FDD_H | | -87.25 + $10\log(N_{RB,c}/50)$ | - |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{OC}$ to be fulfilled.

Note 4: Es/Iot, RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 8: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 9: E-UTRA operating band groups are as defined in Section 3.5.

| | |
|---|---|
| Note 10: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 11: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.2.25.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.26 RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD

The test case in this section are applicable to TDD-FDD carrier aggregation capable UEs which have been configured with a downlink SCell.

### A.9.2.26.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD measurement accuracy in carrier aggregation is within the specified limits. This test will verify the absolute accuracy of RSRQ measurements for the primary component carrier defined in Clause 9.1.11.1, the absolute accuracy of RSRQ measurements for the secondary component carrier defined in Clause 9.1.11.2, and also the relative RSRQ accuracy requirement between primary and secondary component carriers defined in Clause 9.1.11.3.

### A.9.2.26.2 Test parameters

In this test case the PCell is TDD and SCell is FDD. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carrier are tested by using test parameters specified in Table A.9.2.26.2-1. In the test, Cell 1 is the PCell, Cell 2 is the SCell on the Secondary Component Carrier (SCC). The SCC is configured and activated.

The parameters of this test are given in Table A.9.2.26.2-1.

**Table A.9.2.26.2-1: RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD test parameters**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | - |
| Uplink-downlink configuration[Note1] | | 1 | - |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |

| | | | | |
|---|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -119.5 | - |
| | Bands TDD_C | | -118.5 | - |
| | Bands TDD_E | | -117.5 | - |
| | Bands FDD_A | | - | -116 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -115.5 |
| | Bands FDD_C | | - | -115 |
| | Bands FDD_D | | - | -114.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -114 |
| | Bands FDD_G | | - | -113 |
| | Bands FDD_H | | - | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -125.50 | - |
| | Bands TDD_C | | -124.50 | - |
| | Bands TDD_E | | -123.50 | - |
| | Bands FDD_A | | - | -122 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -119.5 |
| | Bands FDD_C | | - | -121 |
| | Bands FDD_D | | - | -120.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -120 |
| | Bands FDD_G | | - | -119 |
| | Bands FDD_H | | - | -118.5 |
| RSRQ Note4 | Bands TDD_A | dB | -17.77 | - |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | - | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |

| | | | | |
|---|---|---|---|---|
| $Io^{Note4}$ | Bands TDD_A | dBm/$BW_{channel}$ | -90.75 + 10log($N_{RB,c}$/50) | - |
| | Bands TDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - |
| | Bands TDD_E | | -88.75 + 10log($N_{RB,c}$/50) | - |
| | Bands FDD_A | | - | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_B1, FDD_B2 Note 11 | | | -85.17 |
| | Bands FDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_D | | - | -85.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_G | | - | -84.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_H | | - | -83.75 + 10log($N_{RB,c}$/50) |
| Propagation Condition | | | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.26.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in section 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.2.27 TDD RSRQ for E-UTRAN Carrier Aggregation for 20MHz+10MHz

The test case in this section are applicable to carrier aggregation capable UEs which have been configured with a downlink SCell.

## A.9.2.27.1 Test Purpose and Environment

The purpose of this test is the same as defined in Subclause A.9.2.6.1.

## A.9.2.27.2 Test parameters

The parameters of this test are the same as defined in Subclause A.9.2.6.2 except that the values of the parameters in the Table A.9.2.27.2-1 will replace the values of the corresponding parameters in A.9.2.6.2-1.

**Table A.9.2.27.2-1: TDD RSRQ Carrier Aggregation test parameters**

| Parameters | | Units | Combination | Test 1 | | |
|---|---|---|---|---|---|---|
| | | | | Cell 1 | Cell 2 | Cell 3 |
| $BW_{channel_CA}$ Note1 | | MHz | 20MHz+10MHz | 20MHz: $N_{RB,c}$ = 100 | 10MHz: $N_{RB,c}$ = 50 | |
| | | | 10MHz+20MHz | 10MHz: $N_{RB,c}$ = 50 | 20MHz: $N_{RB,c}$ = 100 | |
| Measurement bandwidth | | $n_{PRB}$ | 20MHz+10MHz | 47-52 | 22-27 | |
| | | | 10MHz+20MHz | 22-27 | 47-52 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | 20MHz+10MHz | R.3 TDD | R.0 TDD | N/A |
| | | | 10MHz+20MHz | R.0 TDD | R.3 TDD | |
| PDSCH allocation | | $n_{PRB}$ | 20MHz+10MHz | 38-61 | 13-36 | N/A |
| | | | 10MHz+20MHz | 13-36 | 38-61 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | 20MHz+10MHz | R.10 TDD | R.6 TDD | R.6 TDD |
| | | | 10MHz+20MHz | R.6 TDD | R.10 TDD | R.10 TDD |
| OCNG Patterns defined in A.3.2.2 (TDD) | | | 20MHz+10MHz | OP.7 TDD | OP.1 TDD | OP.2 TDD |
| | | | 10MHz+20MHz | OP.1 TDD | OP.7 TDD | OP.8 TDD |
| Io Note2 | Bands TDD_A | dBm/$BW_{channel}$ | All | -90.26 + 10log($N_{RB,c}$/50) | N/A | |
| | Bands TDD_C | | | -89.26 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | | -88.26 + 10log($N_{RB,c}$/50) | | |
| | Bands TDD_A | dBm/$BW_{channel}$ | All | N/A | -85.67 + 10log($N_{RB,c}$/50) | |
| | Bands TDD_C | | | | -84.67 + 10log($N_{RB,c}$/50) | |
| | Bands TDD_E | | | | -83.67 + 10log($N_{RB,c}$/50) | |

Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 2: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: See Table A.9.2.6.2-1 for the other parameters.

## A.9.2.27.3 Test Requirements

The test requirements defined in section A.9.2.6.3 shall apply in this test case.

# A.9.2.28 FDD intra-frequency absolute RSRQ accuracy with CRS based discovery signal

## A.9.2.28.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.14.4.

## A.9.2.28.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement for Cell 2 is tested by using the parameters in Table A.9.2.28.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. Cell 2 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.28.2-1: RSRQ FDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | |
| $BW_{channel}$ | | MHz | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | |
| DMTC period | | ms | N/A | 160 |
| DMTC period offset | | ms | N/A | 10 |
| Discovery signal occasion duration | | ms | N/A | 1 |
| Time offset between cell 1 and cell 2 | | µs | 0 | 2.3 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - |
| *PDSCH allocation* | | $n_{PRB}$ | *13—36* | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -116 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | -115.5 | |
| | Bands FDD_C | | -115 | |
| | Bands FDD_D | | -114.5 | |
| | Bands FDD_E, FDD_F Note 5 | | -114 | |
| | Bands FDD_G Note 7 | | -113 | |
| | Bands FDD_H | | -112.5 | |
| $\hat{E}_s / I_{ot}$ | | dB | -5.46 | -5.46 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -120 | -120 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -119.5 | -119.5 |
| | Bands FDD_C | | -119 | -119 |
| | Bands FDD_D | | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 5 | | -118 | -118 |
| | Bands FDD_G Note 7 | | -117 | -117 |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_H | | -116.5 | -116.5 |
| RSRQ[Note3] | Bands FDD_A [Note 8] | dB | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F [Note 5] | | | |
| | Bands FDD_G [Note 7] | | | |
| | Bands FDD_H | | | |
| Io[Note3] | Bands FDD_A [Note 8] | dBm/9 MHz | -85.67 | |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -85.17 | |
| | Bands FDD_C | | -84.67 | |
| | Bands FDD_D | | -84.17 | |
| | Bands FDD_E, FDD_F [Note 5] | | -83.67 | |
| | Bands FDD_G [Note 7] | | -82.67 | |
| | Bands FDD_H | | -82.17 | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | -4 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.28.3 Test Requirements

The absolute accuracy of RSRQ intra frequency measurement for Cell 2 shall fulfil the requirements in Clause 9.1.14.4.

## A.9.2.29 TDD intra-frequency absolute RSRQ accuracy with CRS based discovery signal

### A.9.2.29.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.14.4.

### A.9.2.29.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement for Cell 2 is tested by using the parameters in Table A.9.2.29.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. Cell 2 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.29.2-1: RSRQ TDD Intra frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note1] | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | |

| | | | | |
|---|---|---|---|---|
| DMTC period | | ms | N/A | 160 |
| DMTC period offset | | ms | N/A | 10 |
| Discovery signal occasion duration | | ms | N/A | 2 |
| Time offset between cell 1 and cell 2 | | µs | 0 | 2.3 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - |
| *PDSCH allocation* | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |
| $N_{oc}$ [Note2] | Bands TDD_A | dBm/15 kHz | -116 | |
| | Bands TDD_C | | -115 | |
| | Bands TDD_E | | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | -5.46 | -5.46 |
| RSRP[Note3] | Bands TDD_A | dBm/15 kHz | -120 | -120 |
| | Bands TDD_C | | -119 | -119 |
| | Bands TDD_E | | -118 | -118 |
| RSRQ[Note3] | Bands TDD_A | dB | -17.34 | -17.34 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| Io[Note3] | Bands TDD_A | dBm/9 MHz | -85.67 | |
| | Bands TDD_C | | -84.67 | |
| | Bands TDD_E | | -83.67 | |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | -4 |
| Propagation condition | | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.29.3 Test Requirements

The absolute accuracy of RSRQ intra frequency measurement for Cell 2 shall fulfil the requirements in Clause 9.1.14.4.

# A.9.2.30 FDD-FDD inter-frequency absolute and relative RSRQ accuracies with CRS based discovery signal

## A.9.2.30.1 Test Purpose and Environment

The purpose of this test is to verify that the absolute and relative accuracy of RSRQ measurement in discovery signal occasions is within the specified limits. This test will verify the requirements in Sections 9.1.14.4.

## A.9.2.30.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.30.2-1. In all tests, Cell 1 is the PCell and Cell 2 the target cell. For measurement of the carrier frequency of Cell 2, DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.30.2-1: RSRQ in discovery signal occasions FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 |
| Gap Pattern Id | | | 0 | - |
| Gap Offset | | ms | 9 | - |
| DMTC period | | ms | - | 160 |
| DMTC period offset | | ms | - | 10 |
| Discovery signal occasion duration | | ms | - | 1 |
| Time offset between cell 2 and cell 1 | | µs | 3 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13-36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -117.5 | -117.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -117 | -117 |
| | Bands FDD_C | | -116.5 | -116.5 |
| | Bands FDD_D | | -116 | -116 |
| | Bands FDD_E, FDD_F Note 5 | | -115.5 | -115.5 |
| | Bands FDD_G Note 7 | | -114.5 | -114.5 |
| | Bands FDD_H | | -114 | -114 |
| $\hat{E}_s / I_{ot}$ | | dB | -6 | -6 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -123.5 | -123.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -123 | -123 |
| | Bands FDD_C | | -122.5 | -122.5 |

| | | | | |
|---|---|---|---|---|
| | Bands FDD_D | | -122 | -122 |
| | Bands FDD_E, FDD_F Note 5 | | -121.5 | -121.5 |
| | Bands FDD_G Note 7 | | -120.5 | -120.5 |
| | Bands FDD_H | | -120 | -120 |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F Note 5 | | | |
| | Bands FDD_G Note 7 | | | |
| | Bands FDD_H | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/ 9 MHz | -88.75 | -88.75 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -88.25 | -88.25 |
| | Bands FDD_C | | -87.75 | -87.75 |
| | Bands FDD_D | | -87.25 | -87.25 |
| | Bands FDD_E, FDD_F Note 5 | | -86.75 | -86.75 |
| | Bands FDD_G Note 7 | | -85.75 | -85.75 |
| | Bands FDD_H | | -85.25 | -85.25 |
| $\hat{E}_s / N_{oc}$ | | dB | -6 | -6 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.30.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Sections 9.1.14.4.

## A.9.2.31 TDD-TDD inter-frequency absolute and relative RSRQ accuracies with CRS based discovery signal

### A.9.2.31.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in discovery signal occasions is within the specified limits. This test will verify the requirements in Sections 9.1.14.4.

### A.9.2.31.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.31.2-1 for TDD configuration 1. In all tests, Cell 1 is the PCell and Cell 2 the target cell. DMTC configuration for Cell 2 is provided to UE in the *measDS-Config* before the start of the test.

**Table A 9.2.31.2-1: RSRQ TDD—TDD Inter frequency test parameters for TDD configuration 1**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 |
| Gap Pattern Id | | | 0 | - |
| Gap Offset | | | 9 | - |
| DMTC period | | ms | - | 160 |
| DMTC period offset | | ms | - | 10 |
| Discovery signal occasion duration | | ms | - | 2 |
| Time offset between cells | | µs | 0 | 3 |
| Special subframe configuration Note1 | | | 6 | |
| Uplink-downlink configuration Note1 | | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -117.50 | -117.50 |
| | Bands TDD_C | | -116.50 | -116.50 |
| | Bands TDD_E | | -115.50 | -115.50 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -123.50 | -123.50 |
| | Bands TDD_C | | -122.50 | -122.50 |
| | Bands TDD_E | | -121.50 | -121.50 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 | -17.77 |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -88.75 | -88.75 |
| | Bands TDD_C | | -87.75 | -87.75 |
| | Bands TDD_E | | -86.75 | -86.75 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| Propagation condition | | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

| | |
|---|---|
| Note 5: | RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.2.31.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Sections 9.1.14.4.

## A.9.2.32 FDD absolute and relative RSRQ accuracy for E-UTRAN Carrier Aggregation in CRS based discovery signal

### A.9.2.32.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRQ measurement accuracy for carrier aggregation in CRS based discovery signal is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier specified in clause 9.1.15.1.2, and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.15.1.3.

### A.9.2.32.2 Test parameters

In this test case the PCell and the SCell are on different carrier frequencies. There are three cells used in this test case. RSRQ absolute and relative accuracy requirements of the primary and secondary component carrier are tested by using test parameters specified in Table A.9.2.32.2-1. In the test, Cell 1 is the PCell, Cell 2 is the SCell on the Secondary Component Carrier (SCC) and Cell 3 is the neighbouring cell on the SCC. Cell 2 on SCC is configured and activated. Cell 3 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.32.2-1: FDD RSRQ Carrier Aggregation Test Parameters**

| Parameters | Test 1 | | | |
|---|---|---|---|---|
| | Units | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel_CA}$ | MHz | 10 | 10 | 10 |
| DMTC period | | N/A | N/A | 160 |
| DMTC period offset | | N/A | N/A | 10 |
| Discovery signal occasion duration | | N/A | N/A | 1 |
| Timeing offset to Cell 1 | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | R.6FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note1] | | | | | |
| OCNG_RB[Note1] | | | | | |
| $N_{oc}$[Note2] | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2[Note 9] | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F[Note 6] | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| $\hat{E}_s/I_{ot}$ | | dB | -4.0 | -5.46 | -5.46 |
| RSRP[Note3] | Bands FDD_A | dBm/15 kHz | -123.5 | -120 | -120 |
| | Bands FDD_B1, FDD_B2[Note 9] | | -123 | -119.5 | -119.5 |
| | Bands FDD_C | | -122.5 | -119 | -119 |
| | Bands FDD_D | | -122 | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F[Note 6] | | -121.5 | -118 | -118 |
| | Bands FDD_G | | -120.5 | -117 | -117 |
| | Bands FDD_H | | -120 | -116.5 | -116.5 |
| RSRQ[Note3] | Bands FDD_A | dB | -16.25 | -17.34 | -17.34 |
| | Bands FDD_B1, FDD_B2[Note 9] | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F[Note 6] | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io[Note3] | Bands FDD_A | dBm/9 MHz | -90.26 | -85.67 | -85.67 |
| | Bands FDD_B1, FDD_B2[Note 9] | | -89.76 | -85.17 | -85.17 |
| | Bands FDD_C | | -89.26 | -84.67 | -84.67 |
| | Bands FDD_D | | -88.76 | -84.17 | -84.17 |
| | Bands FDD_E, FDD_F[Note 6] | | -88.26 | -83.67 | -83.67 |
| | Bands FDD_G | | -87.26 | -82.67 | -82.67 |
| | Bands FDD_H | | -86.76 | -82.17 | -82.17 |
| $\hat{E}_s/N_{oc}$ | | dB | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.32.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.15.1.1, 9.1.15.1.2, and 9.1.15.1.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.15.1.2.

- The relative accuracy of inter-frequency RSRQ measurements between Cell 1 on primary component carriers and Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.15.1.3.

## A.9.2.33 TDD absolute and relative RSRQ accuracy for E-UTRAN Carrier Aggregation in CRS based discovery signal

### A.9.2.33.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRQ measurement accuracy for carrier aggregation in CRS based discovery signal is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier specified in clause 9.1.15.1.2, and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.15.1.3.

### A.9.2.33.2 Test parameters

In this test case the PCell and the SCell are on different carrier frequencies. There are three cells used in this test case. RSRQ absolute and relative accuracy requirements of the primary and secondary component carrier are tested by using test parameters specified in Table A.9.2.33.2-1. In the test, Cell 1 is the PCell, Cell 2 is the SCell on the Secondary Component Carrier (SCC) and Cell 3 is the neighbouring cell on the SCC. Cell 2 on SCC is configured and activated. Cell 3 DMTC configuration is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.33.2-1: TDD RSRQ Carrier Aggregation Test Parameters**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | | |
| DMTC period | | N/A | N/A | 160 |
| DMTC period offset | | N/A | N/A | 10 |
| Discovery signal occasion duration | | N/A | N/A | 2 |
| Timing offset to cell 1 | μs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1 | - |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink-downlink configuration[Note1] | | 1 | | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| $N_{OC}$ [Note3] | Bands TDD_A | dBm/15 kHz | -119.5 | -116 | |
| | Bands TDD_C | | -118.5 | -115 | |
| | Bands TDD_E | | -117.5 | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | -4.0 | -5.46 | -5.46 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -123.50 | -120 | -120 |
| | Bands TDD_C | | -122.50 | -119 | -119 |
| | Bands TDD_E | | -121.50 | -118 | -118 |
| RSRQ[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | -16.25 | -17.34 | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -90.26 | -85.67 | |
| | Bands TDD_C | | -89.26 | -84.67 | |
| | Bands TDD_E | | -88.26 | -83.67 | |
| $\hat{E}_s / N_{oc}$ | | dB | -4.0 | -4.0 | -4.0 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.33.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.15.1.1, 9.1.15.1.2, and 9.1.15.1.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.15.1.2.

- The relative accuracy of inter-frequency RSRQ measurements between Cell 1 on primary component carriers and Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.15.1.3.

# A.9.2.34 FDD—FDD Inter frequency new RSRQ

## A.9.2.34.1 Test Purpose and Environment

The purpose of this test is to verify that the absolute accuracy of RSRQ measurement is within the specified limits when measurement configuration message received by the UE contains *measRSRQ-OnAllSymbols-r12* parameter in TS 36.331 [2]. This test will verify the requirements in Sections 9.1.16.

## A.9.2.34.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. The new RSRQ inter frequency absolute accuracy requirement is tested by using test parameters in Table A.9.2.34.2-1. In the test, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.34.2-1: New RSRQ FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | |
|---|---|---|---|---|
| | | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 |
| Gap Pattern Id | | | 0 | - |
| Antenna Configuration | | | 1x2 | 1x2 |
| Time offset between cell 2 and cell 1 | | µs | 3 | |
| Measurement bandwidth | | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | - |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | | OP.1 FDD | - |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | 0 |
| PSS_RA | | | | 0 |
| SSS_RA | | | | 0 |
| PCFICH_RB | | | | -∞ |
| PHICH_RA | | | | -∞ |
| PHICH_RB | | | | -∞ |
| PDCCH_RA | | | | -∞ |
| PDCCH_RB | | | | -∞ |
| PDSCH_RA | | | | -∞ |
| PDSCH_RB | | | | -∞ |
| OCNG_RA[Note1] | | | | -∞ |
| OCNG_RB[Note1] | | | | -∞ |
| $I_{ot}$ [Note2] | Symbols with CRS, PSS, SSS or PBCH | dBm/15 kHz | -103.85 | -103.85 |
| | All the other symbols | | -94.75 | -94.75 |
| $\hat{E}_s / I_{ot}$ | | dB | -3 | -3 |
| RSRP[Note3] | | dBm/15 kHz | -106.85 | -106.85 |
| RSRQ[Note3] | Subframe 0 | dB | -14.54 | -14.54 |
| | Subframes other than 0 | | -14.14 | -14.14 |
| New RSRQ[Note3] | Subframe 0 | dB | -19.57 | -19.57 |
| | Subframe 5 | | -20.93 | -20.93 |
| | Subframe other than 0 or 5 | | -21.66 | -21.66 |
| Io in subframe 0[Note3] | Symbol 0/4/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/12/13 | | -66.97 | -66.97 |
| | Symbol 5/6/8/9/10 | | -75.81 | -75.81 |
| | Symbol 7 | | -75.52 | -75.52 |

| | | | | |
|---|---|---|---|---|
| Io in subframe 5 Note3 | Symbol 0/4/7/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/8/9/10/12/13 | | -66.97 | -66.97 |
| | Symbol 5/6 | | -75.81 | -75.81 |
| Io in subframes other than 0 or 5 Note3 | Symbol 0/4/7/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/5/6/8/9/10/12/13 | | -66.97 | -66.97 |
| Propagation condition | | - | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP, new RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The new RSRQ values assume RSSI averaging over all OFDM symbols of the subframe.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.2.34.3 Test Requirements

The new RSRQ measurement accuracy for cell 2 shall fulfil the requirements in Section 9.1.16, compared with any nominal new RSRQ value in subframe 0, 5 or others.

## A.9.2.35 TDD—TDD Inter frequency new RSRQ

### A.9.2.35.1 Test Purpose and Environment

The purpose of this test is to verify that the absolute accuracy of RSRQ measurement is within the specified limits when measurement configuration message received by the UE contains *measRSRQ-OnAllSymbols-r12* parameter in TS 36.331 [2]. This test will verify the requirements in Sections 9.1.16.

### A.9.2.35.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. The new RSRQ inter frequency absolute accuracy requirement is tested by using test parameters in Table A.9.2.35.2-1. In the test, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.35.2-1: New RSRQ TDD—TDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Special subframe configuration Note1 | | 6 | 6 |
| Uplink-downlink configuration Note1 | | 1 | 1 |
| Gap Pattern Id | | 0 | - |
| Antenna Configuration | | 1x2 | 1x2 |
| Time offset between cell 2 and cell 1 | µs | 3 | |
| Measurement bandwidth | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | - |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | - |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | 0 |
| PSS_RA | | | 0 |

| | | | | |
|---|---|---|---|---|
| SSS_RA | | | | 0 |
| PCFICH_RB | | | | -∞ |
| PHICH_RA | | | | -∞ |
| PHICH_RB | | | | -∞ |
| PDCCH_RA | | | | -∞ |
| PDCCH_RB | | | | -∞ |
| PDSCH_RA | | | | -∞ |
| PDSCH_RB | | | | -∞ |
| OCNG_RA Note1 | | | | -∞ |
| OCNG_RB Note1 | | | | -∞ |
| $I_{ot}$ Note2 | Symbols with CRS, PSS, SSS or PBCH | dBm/15 kHz | -103.85 | -103.85 |
| | All the other symbols | | -94.75 | -94.75 |
| $\hat{E}_s / I_{ot}$ | | dB | -3 | -3 |
| RSRP Note3 | | dBm/15 kHz | -106.85 | -106.85 |
| RSRQ Note3 | Subframe 0 | dB | -14.54 | -14.54 |
| | Subframes other than 0 | | -14.14 | -14.14 |
| New RSRQ Note3 | Subframe 0 | dB | -20.08 | -20.08 |
| | Subframe 5 | | -21.31 | -21.31 |
| | Subframe 1 or 6 | | -20.82 | -20.82 |
| | Subframe other than 0, 1, 5 or 6 | | -21.66 | -21.66 |
| Io in subframe 0 Note3 | Symbol 0/4/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/5/6/12 | | -66.97 | -66.97 |
| | Symbol 8/9/10/13 | | -75.81 | -75.81 |
| | Symbol 7 | | -75.52 | -75.52 |
| Io in subframe 5 Note3 | Symbol 0/4/7/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/5/6/8/9/10/12 | | -66.97 | -66.97 |
| | Symbol 13 | | -75.81 | -75.81 |
| Io in subframe 1 or 6 Note3 | Symbol 0/4/7 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/3/5/6/8 | | -66.97 | -66.97 |
| | Symbol 2 | | -75.81 | -75.81 |
| Io in subframes other than 0, 1, 5 or 6 Note3 | Symbol 0/4/7/11 | dBm/ 9 MHz | -75.72 | -75.72 |
| | Symbol 1/2/3/5/6/8/9/10/12/ 13 | | -66.97 | -66.97 |
| Propagation condition | | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRQ, RSRP, new RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The new RSRQ values assume RSSI averaging over all OFDM symbols of the subframe.

Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.9.2.35.3 Test Requirements

The new RSRQ measurement accuracy for cell 2 shall fulfil the requirements in Section 9.1.16, compared with any nominal new RSRQ value in subframe 0, 5, 1, 6 or others.

# A.9.2.36 FDD—FDD Inter frequency RSRQ measured on all OFDM symbols

## A.9.2.36.1 Test Purpose and Environment

The purpose of this test is to verify that the absolute accuracy of RSRQ measurement is within the specified limits when measurement configuration message received by the UE contains *measRSRQ-OnAllSymbols-r12* parameter in TS 36.331 [2]. This test will verify the requirements in Section 9.1.16.

A.9.2.3 is also conducted even if UE is capable of measuring RSRQ on all OFDM symbols.

## A.9.2.36.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ measured on all OFDM symbols inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.36.2-1. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.36.2-1: FDD—FDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Gap Pattern Id | | 0 | - |
| Antenna Configuration | | 1x2 | 1x2 |
| Time offset between cell 2 and cell 1 | µs | 3 | |
| Measurement bandwidth | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | OP.1 FDD | OP.2 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA Note1 | | | |
| OCNG_RB Note1 | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -80 | -80 |
| $\hat{E}_s / I_{ot}$ | dB | -1.75 | -1.75 |
| RSRP Note3 | dBm/15 kHz | -81.75 | -81.75 |
| RSRQ Note3 | dB | -14.76 | -14.76 |
| Io Note3 | dBm/ 9 MHz | -50 | -50 |
| $\hat{E}_s / N_{oc}$ | dBm/ 9 MHz | -1.75 | -1.75 |

| Propagation condition | - | AWGN |
|---|---|---|
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The RSRQ values assume RSSI averaging over all OFDM symbols of the subframe.<br>Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | |

### A.9.2.36.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Section 9.1.16.

## A.9.2.37 TDD—TDD Inter frequency RSRQ measurement on all OFDM symbols

### A.9.2.37.1 Test Purpose and Environment

The purpose of this test is to verify that the absolute accuracy of RSRQ measurement is within the specified limits when measurement configuration message received by the UE contains *measRSRQ-OnAllSymbols-r12* parameter in TS 36.331 [2]. This test will verify the requirements in Section 9.1.16.

A.9.2.4 is also conducted even if UE is capable of measuring RSRQ on all OFDM symbols..

### A.9.2.37.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RSRQ measured on all OFDM symbols inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.37.2-1. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.37.2-1: TDD-TDD Inter frequency test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 |
| Special subframe configuration Note1 | | 6 | 6 |
| Uplink-downlink configuration Note1 | | 1 | 1 |
| Gap Pattern Id | | 0 | - |
| Antenna Configuration | | 1x2 | 1x2 |
| Time offset between cell 2 and cell 1 | µs | 3 | |
| Measurement bandwidth | $n_{PRB}$ | 22-27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA Note1 | | | |
| OCNG_RB Note1 | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -80 | -80 |
| $\hat{E}_s / I_{ot}$ | dB | -1.75 | -1.75 |
| RSRP Note3 | dBm/15 kHz | -81.75 | -81.75 |
| RSRQ Note3 | dB | -14.76 | -14.76 |
| Io Note3 | dBm/ 9 MHz | -50 | -50 |
| $\hat{E}_s / N_{oc}$ | dBm/ 9 MHz | -1.75 | -1.75 |
| Propagation condition | - | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. The RSRQ values assume RSSI averaging over all OFDM symbols of the subframe.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

## A.9.2.37.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Section 9.1.16.

# A.9.2.38 3 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with two downlink SCells.

## A.9.2.38.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.38.2 Test parameters

In this set of test cases there are three cells on three carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, and Cell 3 is activated SCell on channel 3. The parameters for the test are listed in Table A.9.2.38.2-1.

**Table A.9.2.38.2-1: 3 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters (cell #1, cell #2 and cell #3)**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | - | 6 | 6 |
| Uplink/downlink configuration[Note1] | | - | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2 | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| Bands TDD_A | | - | -116 | -116 |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note3 | Bands TDD_C | dBm/ 15kHz | - | -115 | -115 |
| | Bands TDD_E | | - | -114 | -114 |
| | Bands FDD_A | | -119.5 | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | - | - |
| | Bands FDD_C | | -118.5 | - | - |
| | Bands FDD_D | | -118 | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | - | - |
| | Bands FDD_G | | -116.5 | - | - |
| | Bands FDD_H | | -116 | - | - |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | - | -122 | -122 |
| | Bands TDD_C | | - | -121 | -121 |
| | Bands TDD_E | | - | -120 | -120 |
| | Bands FDD_A | | -125.5 | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -125 | - | - |
| | Bands FDD_C | | -124.5 | - | - |
| | Bands FDD_D | | -124 | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | - | - |
| | Bands FDD_G | | -122.5 | - | - |
| | Bands FDD_H | | -122 | - | - |
| RSRQ Note4 | Bands TDD_A | dB | - | -17.77 | -17.77 |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| | Bands FDD_A | | -17.77 | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | - | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |

| | | | | | |
|---|---|---|---|---|---|
| | Bands TDD_E | | - | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | - | - |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | ≤ TAE | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.38.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.39 3 DL PCell in TDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with two downlink SCells.

## A.9.2.39.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD-FDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier defined in Clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier defined in Clause 9.1.11.2, and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers defined in Clause 9.1.11.3.

## A.9.2.39.2 Test parameters

In this set of cases cell 1 is PCell on the primary component carrier, and cell 2 and cell 3 are activated SCells on secondary component carriers SCC1 and SCC2 respectively. The test parameters for the test are listed in Table A.9.2.39.2-1.

**Table A.9.2.39.2-1: 3 Downlink TDD-FDD RSRQ carrier aggregation test parameters with PCell in TDD (cell #1, cell #2 and cell #3)**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | - | - |
| Uplink/downlink configuration[Note1] | | 1 | - | - |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 and A.3.1.1.2 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 and A.3.1.2.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 and A.3.2.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -119.5 | - | - |
| | Bands TDD_C | | -118.5 | - | - |
| | Bands TDD_E | | -117.5 | - | - |
| | Bands FDD_A | | - | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -115.5 | -115.5 |
| | Bands FDD_C | | - | -115 | -115 |
| | Bands FDD_D | | - | -114.5 | -114.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -114 | -114 |
| | Bands FDD_G | | - | -113 | -113 |
| | Bands FDD_H | | - | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.00 | -6.00 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -125.50 | - | - |
| | Bands TDD_C | | -124.50 | - | - |
| | Bands TDD_E | | -123.50 | - | - |
| | Bands FDD_A | | - | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -121.5 | -121.5 |
| | Bands FDD_C | | - | -121 | -121 |
| | Bands FDD_D | | - | -120.5 | -120.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -120 | -120 |
| | Bands FDD_G | | - | -119 | -119 |
| | Bands FDD_H | | - | -118.5 | -118.5 |
| RSRQ Note4 | Bands TDD_A | dB | -17.77 | - | - |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| | Bands FDD_A | | - | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -90.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands TDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands TDD_E | | -88.75 + 10log($N_{RB,c}$/50) | - | - |
| | Bands FDD_A | | - | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -86.75 + 10log($N_{RB,c}$/50) | -86.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_D | | - | -85.75 + 10log($N_{RB,c}$/50) | -85.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_G | | - | -84.25 + 10log($N_{RB,c}$/50) | -84.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_H | | - | -83.75 + 10log($N_{RB,c}$/50) | -83.75 + 10log($N_{RB,c}$/50) |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | ≤ TAE | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.39.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.40 3 DL FDD RSRQ for E-UTRAN in Carrier Aggregation

## A.9.2.40.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.40.2 Test parameters

In this test case the PCell and the SCells are on different carrier frequencies. There are three cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carriers are tested by using test parameters specified in Table A.9.2.40.2-1. In the test, Cell 1 is the PCell, Cell 2 and Cell 3 are the SCells on secondary component carrier SCC1 and SCC2 respectively. The SCC1 and SCC2 are configured and activated.

**Table A.9.2.40.2-1: 3 DL FDD RSRQ carrier aggregation test parameters**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | 3 |
| $BW_{channel}$ | | MHz | 5MHz:$N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz:$N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz:10-15<br>10MHz:22-27<br>20MHz:47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F Note 6 | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ Note3 | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -125 | -121.5 | -121.5 |
| | Bands FDD_C | | -124.5 | -121 | -121 |
| | Bands FDD_D | | -124 | -120.5 | -120.5 |
| | Bands FDD_E, FDD_F Note 6 | | -123.5 | -120 | -120 |
| | Bands FDD_G | | -122.5 | -119 | -119 |
| | Bands FDD_H | | -122 | -118.5 | -118.5 |
| RSRQ Note3 | Bands FDD_A | dB | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -90.75+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -90.25+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_C | | -89.75+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_D | | -89.25+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_E, FDD_F Note 6 | | -88.75+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_G | | -87.75+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_H | | -87.25+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.40.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.2.41 3 DL TDD RSRQ for E-UTRAN in Carrier Aggregation

## A.9.2.41.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRQ measurement accuracy in carrier aggregation is within the specified limits in a synchronized network environment with AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier defined in Clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers defined in Clause 9.1.11.2, and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers defined in Clause 9.1.11.3.

## A.9.2.41.2 Test parameters

In the test there are three synchronous cells: Cell 1, Cell 2 and Cell 3. Cell 1 is PCell, Cell 2 and Cell 3 are the SCells on secondary component carrier SCC1 and SCC2 respectively. PCell and SCells are in different RF channels. The parameters for the test are listed in Table A.9.2.41.2-1.

**Table A.9.2.41.2-1: 3 DL TDD RSRQ carrier aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell2 | Cell3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink-downlink configuration[Note1] | | 1 | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands TDD_C | | -118.5 | -115 | -115 |
| | Bands TDD_E | | -117.5 | -114 | -114 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ Note4 | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands TDD_C | | -124.5 | -121 | -121 |
| | Bands TDD_E | | -123.5 | -120 | -120 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 | -17.77 | -17.77 |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -90.75+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_C | | -89.75+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_E | | -88.75+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.41.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in section 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.2.42 FD-FDD RSRQ Intra frequency case for UE category 0

## A.9.2.42.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.13.3 for FD-FDD intra frequency RSRQ measurements for UE category 0.

## A.9.2.42.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.42.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.42.2-1: FD-FDD RSRQ Intra frequency test parameters for UE category 0**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.3 | | | R.13 FDD | - | R.13 FDD | - | R.13 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-0_A Note 7 | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands FDD-0_B | | | | | | -115.5 | |
| | Bands FDD-0_C | | | | | | -115 | |
| | Bands FDD-0_D | | | | | | -114.5 | |
| | Bands FDD-0_E, FDD-0_F Note 5 | | | | | | -114 | |
| | Bands FDD-0_G Note 7 | | | | | | -113 | |
| | Bands FDD-0_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -1.76 | -1.76 | -4.7 | -4.7 | -5.46 | -5.46 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RSRP[Note3] | Bands FDD-0_A Note 7 | dBm/15 kHz | -81.76 | -81.76 | -106.75 | -106.75 | -120 | -120 |
| | Bands FDD-0_B | | | | | | -119.5 | -119.5 |
| | Bands FDD-0_C | | | | | | -119 | -119 |
| | Bands FDD-0_D | | | | | | -118.5 | -118.5 |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -118 | -118 |
| | Bands FDD-0_G Note 6 | | | | | | -117 | -117 |
| | Bands FDD-0_H | | | | | | -116.5 | -116.5 |
| RSRQ[Note3] | Bands FDD-0_A Note 7 | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| | Bands FDD-0_B | | | | | | | |
| | Bands FDD-0_C | | | | | | | |
| | Bands FDD-0_D | | | | | | | |
| | Bands FDD-0_E, FDD-0_F Note 45 | | | | | | | |
| | Bands FDD-0_G Note 6 | | | | | | | |
| | Bands FDD-0_H | | | | | | | |
| Io[Note3] | Bands FDD-0_A Note 7 | dBm/9 MHz | -50 | | -73 | | -85.67 | |
| | Bands FDD-0_B | | | | | | -85.17 | |
| | Bands FDD-0_C | | | | | | -84.67 | |
| | Bands FDD-0_D | | | | | | -84.17 | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -83.67 | |
| | Bands FDD-0_G Note 6 | | | | | | -82.67 | |
| | Bands FDD-0_H | | | | | | -82.17 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 5: E-UTRA operating band groups are as defined in Section 3.5.

Note 6: Except Band 29.

Note 7: Except Band 32, Band 75, Band 76.

### A.9.2.42.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.13.3.

## A.9.2.43 HD-FDD RSRQ Intra frequency case for UE category 0

### A.9.2.43.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.13.3 for HD-FDD intra frequency RSRQ measurements for UE category 0.

### A.9.2.43.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.43.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.43.2-1: HD-FDD RSRQ Intra frequency test parameters for UE category 0**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.4 | | | R.1 HD-FDD | - | R.1 HD-FDD | - | R.1 HD-FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.3 | | | R.3 HD-FDD | | R.3 HD-FDD | | R.3 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD-0_A Note 7 | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands FDD-0_B | | | | | | -115.5 | |
| | Bands FDD-0_C | | | | | | -115 | |
| | Bands FDD-0_D | | | | | | -114.5 | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -114 | |
| | Bands FDD-0_G Note 7 | | | | | | -113 | |
| | Bands FDD-0_H | | | | | | -112.5 | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -1.76 | -1.76 | -4.7 | -4.7 | -5.46 | -5.46 |
| RSRP Note3 | Bands FDD-0_A Note 7 | dBm/15 kHz | -81.76 | -81.76 | -106.75 | -106.75 | -120 | -120 |
| | Bands FDD-0_B | | | | | | -119.5 | -119.5 |
| | Bands FDD-0_C | | | | | | -119 | -119 |
| | Bands FDD-0_D | | | | | | -118.5 | -118.5 |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | -118 | -118 |
| | Bands FDD-0_G Note 6 | | | | | | -117 | -117 |
| | Bands FDD-0_H | | | | | | -116.5 | -116.5 |
| RSRQ Note3 | Bands FDD-0_A Note 7 | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| | Bands FDD-0_B | | | | | | | |
| | Bands FDD-0_C | | | | | | | |
| | Bands FDD-0_D | | | | | | | |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | | | | |
| | Bands FDD-0_G Note 6 | | | | | | | |
| | Bands FDD-0_H | | | | | | | |
| Io Note3 | Bands FDD-0_A Note 7 | dBm/9 MHz | -50 | | -73 | | -85.67 | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD-0_B | | | | -85.17 |
| | Bands FDD-0_C | | | | -84.67 |
| | Bands FDD-0_D | | | | -84.17 |
| | Bands FDD-0_E, FDD-0_F Note 4 | | | | -83.67 |
| | Bands FDD-0_G Note 6 | | | | -82.67 |
| | Bands FDD-0_H | | | | -82.17 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | | 1x1 | 1x1 | 1x1 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 5: E-UTRA operating band groups are as defined in Section 3.5.
Note 6: Except Band 29.
Note 7: Except Band 32, Band 75, Band 76.

### A.9.2.43.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.13.3.

## A.9.2.44 TDD RSRQ Intra frequency case for UE category 0

### A.9.2.44.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.13.3 for TDD intra frequency RSRQ measurements for UE category 0.

### A.9.2.44.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.44.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.2.44.2-1: TDD RSRQ Intra frequency test parameters for UE category 0**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | MHz | 10 | | 10 | | 10 | |
| Special subframe configuration Note1 | | 6 | | 6 | | 6 | |
| Uplink-downlink configuration Note1 | | 1 | | 1 | | 1 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.5 | | R.12 TDD | - | R.12 TDD | - | R.12 TDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | | R.6 TDD | | R.6 TDD | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA[Note2] | | | | | | | | |
| OCNG_RB[Note2] | | | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD-0_A | dBm/15 kHz | -84.76 | | -103.85 | | -116 | |
| | Bands TDD-0_C | | | | | | -115 | |
| | Bands TDD-0_E | | | | | | -114 | |
| $\hat{E}_s / N_{oc}$ | | dB | 3 | 3 | -2.9 | -2.9 | -4 | -4 |
| $\hat{E}_s / I_{ot}$ | | dB | -1.76 | -1.76 | -4.7 | -4.7 | -5.46 | -5.46 |
| RSRP[Note4] | Bands TDD-0_A | dBm/15 kHz | -81.76 | -81.76 | -106.75 | -106.75 | -120 | -120 |
| | Bands TDD-0_C | | | | | | -119 | -119 |
| | Bands TDD-0_E | | | | | | -118 | -118 |
| RSRQ[Note4] | Bands TDD-0_A, TDD-0_C, TDD-0_E | dB | -14.77 | -14.77 | -16.76 | -16.76 | -17.34 | -17.34 |
| Io[Note4] | Bands TDD-0_A | dBm/9 MHz | -50 | | -73 | | -85.67 | |
| | Bands TDD-0_C | | | | | | -84.67 | |
| | Bands TDD-0_E | | | | | | -83.67 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Correlation Matrix and Antenna Configuration | | | 1x1 | | 1x1 | | 1x1 | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.44.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in Clause 9.1.13.3.

## A.9.2.45 4 DL CA PCell in FDD FDD-TDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with three downlink SCells.

### A.9.2.45.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.45.2 Test parameters

In this set of test cases there are four cells on four carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, and Cell 4 is activated SCell on channel 4. The parameters for the test are listed in Table A.9.2.45.2-1.

**Table A.9.2.45.2-1: 4 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters (cell #1, cell #2, cell #3 and cell #4)**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 |
|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | 3 | 4 |
| $BW_{channel}$ | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | | - | 6 | 6 | 6 |
| Uplink/downlink configuration[Note1] | | | - | 1 | 1 | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA[Note2] | | | | | | |
| OCNG_RB[Note2] | | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/ 15kHz | - | -116 | -116 | -116 |
| | Bands TDD_C | | - | -115 | -115 | -115 |
| | Bands TDD_E | | - | -114 | -114 | -114 |
| | Bands FDD_A | | -119.5 | - | - | - |
| | Bands FDD_B1, FDD_B2 [Note 11] | | -119 | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_C | | -118.5 | - | - | - |
| | Bands FDD_D | | -118 | - | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | - | - | - |
| | Bands FDD_G | | -116.5 | - | - | - |
| | Bands FDD_H | | -116 | - | - | - |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | - | -122 | -122 | -122 |
| | Bands TDD_C | | - | -121 | -121 | -121 |
| | Bands TDD_E | | - | -120 | -120 | -120 |
| | Bands FDD_A | | -125.5 | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -125 | - | - | - |
| | Bands FDD_C | | -124.5 | - | - | - |
| | Bands FDD_D | | -124 | - | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | - | - | - |
| | Bands FDD_G | | -122.5 | - | - | - |
| | Bands FDD_H | | -122 | - | - | - |
| RSRQ Note4 | Bands TDD_A | dB | - | -17.77 | -17.77 | -17.77 |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | -17.77 | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | - | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands TDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_E | | - | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | - | - | - |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.45.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.46 4 DL CA PCell in TDD TDD-FDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with three downlink SCells.

## A.9.2.46.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.46.2 Test parameters

In this set of test cases there are four cells on four carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, and Cell 4 is activated SCell on channel 4. The parameters for the test are listed in Table A.9.2.45.2-1.

**Table A.9.2.46.2-1: 4 DL PCell in TDD RSRQ for E-UTRAN in Carrier Aggregation test parameters (cell #1, cell #2, cell #3 and cell #4)**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | - | - | - |
| Uplink/downlink configuration[Note1] | | 1 | - | - | - |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 |
| OCNG Patterns defined in A.3.2 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD |

| | | | 20MHz: OP.7 TDD | 20MHz: OP.11 FDD | 20MHz: OP.11 | 20MHz: OP.11 |
|---|---|---|---|---|---|---|
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |
| PDSCH_RA | | | | | | |
| PDSCH_RB | | | | | | |
| OCNG_RA Note2 | | | | | | |
| OCNG_RB Note2 | | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -119.5 | - | - | - |
| | Bands TDD_C | | -118.5 | - | - | - |
| | Bands TDD_E | | -117.5 | - | - | - |
| | Bands FDD_A | | - | -116 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -115.5 | -115.5 | -115.5 |
| | Bands FDD_C | | - | -115 | -115 | -115 |
| | Bands FDD_D | | - | -114.5 | -114.5 | -114.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -114 | -114 | -114 |
| | Bands FDD_G | | - | -113 | -113 | -113 |
| | Bands FDD_H | | - | -112.5 | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -125.5 | - | - | - |
| | Bands TDD_C | | -124.5 | - | - | - |
| | Bands TDD_E | | -123.5 | - | - | - |
| | Bands FDD_A | | - | -122 | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -121.5 | -121.5 | -121.5 |
| | Bands FDD_C | | - | -121 | -121 | -121 |
| | Bands FDD_D | | - | -120.5 | -120.5 | -120.5 |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -120 | -120 | -120 |
| | Bands FDD_G | | - | -119 | -119 | -119 |
| | Bands FDD_H | | - | -118.5 | -118.5 | -118.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| RSRQ[Note4] | Bands TDD_A | dB | -17.77 | - | - | - |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | - | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 [Note 11] | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, Bands FDD_F [Note 6] | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -90.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands TDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands TDD_E | | -88.75 + 10log($N_{RB,c}$/50) | - | - | - |
| | Bands FDD_A | | - | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_B1, FDD_B2 [Note 11] | | - | -86.75 + 10log($N_{RB,c}$/50) | -86.75 + 10log($N_{RB,c}$/50) | -86.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_D | | - | -85.75 + 10log($N_{RB,c}$/50) | -85.75 + 10log($N_{RB,c}$/50) | -85.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_E, Bands FDD_F [Note 6] | | - | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_G | | - | -84.25 + 10log($N_{RB,c}$/50) | -84.25 + 10log($N_{RB,c}$/50) | -84.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_H | | - | -83.75 + 10log($N_{RB,c}$/50) | -83.75 + 10log($N_{RB,c}$/50) | -83.75 + 10log($N_{RB,c}$/50) |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 | 0 |
| Time alignment error relative to cell 1 [Note 10] | | | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 [Note 10] | | | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 [Note 10] | | | - | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.46.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.47 5 DL FDD-TDD with PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with four downlink SCells.

### A.9.2.47.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.47.2 Test parameters

In this set of test cases there are five cells on five carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, Cell 4 is activated SCell on channel 4, and Cell 5 is activated SCell on channel 5. The parameters for the test are listed in Table A.9.2.45.2-1.

**Table A.9.2.47.2-1: 5 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters (cell #1, cell #2, cell #3, cell #4 and cell#5)**

| Parameter | Unit | Cell 1 | Cells | | | |
|---|---|---|---|---|---|---|
| | | | 2 | 3 | 4 | 5 |
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 | 5 |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25 | 5MHz: $N_{RB,c}$ = 25 | | | |

| | | | | |
|---|---|---|---|---|
| | | | 10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration Note1 | | | - | 6 |
| Uplink/downlink configuration Note1 | | | - | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | - | -116 |
| | Bands TDD_C | | - | -115 |
| | Bands TDD_E | | - | -114 |
| | Bands FDD_A | | -119.5 | - |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | - |
| | Bands FDD_C | | -118.5 | - |
| | Bands FDD_D | | -118 | - |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | - |
| | Bands FDD_G | | -116.5 | - |
| | Bands FDD_H | | -116 | - |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | - | -122 |
| | Bands TDD_C | | - | -121 |
| | Bands TDD_E | | - | -120 |
| | Bands FDD_A | | -125.5 | - |
| | Bands FDD_B, FDD_B2 Note 11 | | -125 | - |
| | Bands FDD_C | | -124.5 | - |
| | Bands FDD_D | | -124 | - |
| | Bands FDD_E, | | -123.5 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_F Note 6 | | | | | | |
| | Bands FDD_G | | -122.5 | - | | | |
| | Bands FDD_H | | -122 | - | | | |
| RSRQ Note4 | Bands TDD_A | dB | - | -17.77 | | | |
| | Bands TDD_C | | | | | | |
| | Bands TDD_E | | | | | | |
| | Bands FDD_A | | -17.77 | - | | | |
| | Bands FDD_B, FDD_B2 Note 11 | | | | | | |
| | Bands FDD_C | | | | | | |
| | Bands FDD_D | | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | | | |
| | Bands FDD_G | | | | | | |
| | Bands FDD_H | | | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | - | -87.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands TDD_C | | - | -86.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands TDD_E | | - | -85.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_B, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | - | | | |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | - | | | |
| Propagation Condition | | | AWGN | AWGN | | | |
| Antenna Configuration | | | 1x2 | 1x2 | | | |
| Timing offset to Cell 1 | | µs | - | 0 | | | |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 10 | | | - | - | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

| | |
|---|---|
| Note 7: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 8: | Void |
| Note 9: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 10: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 11: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

### A.9.2.47.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 5 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.48 5 DL FDD-TDD with PCell in TDD RSRQ for E-UTRAN in Carrier Aggregation

The test case in this clause is applicable to carrier aggregation capable UEs which have been configured with four downlink SCells.

### A.9.2.48.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.48.2 Test parameters

In this set of test cases there are five cells on five carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, Cell 4 is activated SCell on channel 4, and Cell 5 is activated SCell on channel 5. The parameters for the test are listed in Table A.9.2.45.2-1.

**Table A.9.2.48.2-1: 5 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters (cell #1, cell #2, cell #3, cell #4 and cell#5)**

| Parameter | | Unit | Cell 1 | Cells | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2 | 3 | 4 | 5 |
| E-UTRA RF Channel Number | | | 1 | 2 | 3 | 4 | 5 |
| $BW_{channel}$ | | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| Special subframe configuration Note1 | | | 6 | - | | | |
| Uplink/downlink configuration Note1 | | | 1 | - | | | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | | |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | | | |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | | | |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | | | |
| PBCH_RA | | dB | 0 | 0 | | | |
| PBCH_RB | | | | | | | |
| PSS_RA | | | | | | | |
| SSS_RA | | | | | | | |
| PCFICH_RB | | | | | | | |
| PHICH_RA | | | | | | | |
| PHICH_RB | | | | | | | |
| PDCCH_RA | | | | | | | |
| PDCCH_RB | | | | | | | |
| PDSCH_RA | | | | | | | |
| PDSCH_RB | | | | | | | |
| OCNG_RA Note2 | | | | | | | |
| OCNG_RB Note2 | | | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | - | | | |
| | Bands TDD_C | | -115 | - | | | |
| | Bands TDD_E | | -114 | - | | | |
| | Bands FDD_A | | - | -119.5 | | | |
| | Bands FDD_B1, FDD_B2 Note 11 | | - | -119 | | | |
| | Bands FDD_C | | - | -118.5 | | | |
| | Bands FDD_D | | - | -118 | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -117.5 | | | |
| | Bands FDD_G | | - | -116.5 | | | |
| | Bands FDD_H | | - | -116 | | | |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | | | |

| | | | | |
|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | -122 | - |
| | Bands TDD_C | | -121 | - |
| | Bands TDD_E | | -120 | - |
| | Bands FDD_A | | - | -125.5 |
| | Bands FDD_B1, FDD_B2 [Note 11] | | - | -125 |
| | Bands FDD_C | | - | -124.5 |
| | Bands FDD_D | | - | -124 |
| | Bands FDD_E, Bands FDD_F [Note 6] | | - | -123.5 |
| | Bands FDD_G | | - | -122.5 |
| | Bands FDD_H | | - | -122 |
| RSRQ[Note4] | Bands TDD_A | dB | -17.77 | - |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | - | -17.77 |
| | Bands FDD_B1, FDD_B2 [Note 11] | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, Bands FDD_F [Note 6] | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | - |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | - |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | - |
| | Bands FDD_A | | - | -90.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_B1, FDD_B2 [Note 11] | | - | -90.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_C | | - | -89.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_D | | - | -89.25 + 10log($N_{RB,c}$/50) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_E, Bands FDD_F Note 6 | | - | -88.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_G | | - | -87.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_H | | - | -87.25 + 10log($N_{RB,c}$/50) | | | |
| Propagation Condition | | | AWGN | AWGN | | | |
| Antenna Configuration | | | 1x2 | 1x2 | | | |
| Timing offset to Cell 1 | | µs | 0 | - | | | |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 10 | | | - | - | - | - | ≤ TAE |
| Time alignment error relative to cell 4 Note 10 | | | - | - | - | - | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.48.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 5 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.49 5 DL FDD RSRQ for E-UTRAN in Carrier Aggregation

## A.9.2.49.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.49.2 Test parameters

In this set of test cases the PCell and the SCells are on different carrier frequencies. There are five cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carriers are tested by using test parameters specified in Table A.9.2.49.2-1 and Table A.9.2.49.2-2. In the test, Cell 1 is the PCell, Cell 2, Cell 3, Cell 4 and Cell 5 are the SCells on secondary component carrier SCC1, SCC2, SCC3 and SCC4 respectively. The SCC1, SCC2, SCC3 and SCC4 are configured and activated.

**Table A.9.2.49.2-1: 5 DL FDD RSRQ carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| $BW_{channel}$ | MHz | 5MHz:$N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz:$N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz:10-15<br>10MHz:22-27<br>20MHz:47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |

| | | | | | |
|---|---|---|---|---|---|
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F Note 6 | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -125 | -121.5 | -121.5 |
| | Bands FDD_C | | -124.5 | -121 | -121 |
| | Bands FDD_D | | -124 | -120.5 | -120.5 |
| | Bands FDD_E, FDD_F Note 6 | | -123.5 | -120 | -120 |
| | Bands FDD_G | | -122.5 | -119 | -119 |
| | Bands FDD_H | | -122 | -118.5 | -118.5 |
| RSRQ Note3 | Bands FDD_A | dB | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -90.75+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -90.25+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_C | | -89.75+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_D | | -89.25+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_E, FDD_F Note 6 | | -88.75+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_G | | -87.75+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_H | | -87.25+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.2.49.2-2: 5 DL FDD RSRQ carrier aggregation test parameters for cell 4 and cell 5**

| Parameter | | Unit | Cell 4 | Cell 5 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 2 | 3 |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -115.5 | -115.5 |
| | Bands FDD_C | | -115 | -115 |
| | Bands FDD_D | | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F Note 6 | | -114 | -114 |
| | Bands FDD_G | | -113 | -113 |
| | Bands FDD_H | | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -6.0 | -6.0 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -121.5 | -121.5 |
| | Bands FDD_C | | -121 | -121 |
| | Bands FDD_D | | -120.5 | -120.5 |
| | Bands FDD_E, FDD_F Note 6 | | -120 | -120 |
| | Bands FDD_G | | -119 | -119 |
| | Bands FDD_H | | -118.5 | -118.5 |

| | | | | |
|---|---|---|---|---|
| RSRQ[Note3] | Bands FDD_A | dB | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, FDD_F [Note 6] | | | |
| | Bands FDD_G | | | |
| | Bands FDD_H | | | |
| Io[Note3] | Bands FDD_A | dBm/ $BW_{channel}$ | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -86.75+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_C | | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_D | | -85.75+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_E, FDD_F [Note 6] | | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_G | | -84.25+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_H | | -83.75+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 0 |
| Time alignment error relative to cell 1 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 [Note 7] | | | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.49.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC3 for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC4 for Cell 5 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.2.50 5 DL TDD RSRQ for E-UTRAN in Carrier Aggregation

## A.9.2.50.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.50.2 Test parameters

In this set of test cases the PCell and the SCells are on different carrier frequencies. There are five cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carriers are tested by using test parameters specified in Table A.9.2.50.2-1 and Table A.9.2.50.2-2. In the test, Cell 1 is the PCell, Cell 2, Cell 3, Cell 4 and Cell 5 are the SCells on secondary component carrier SCC1, SCC2, SCC3 and SCC4 respectively. The SCC1, SCC2, SCC3 and SCC4 are configured and activated.

**Table A.9.2.50.2-1: 5 DL TDD RSRQ carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | 6 | | |
| Uplink-downlink configuration[Note1] | | 1 | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands TDD_C | | -118.5 | -115 | -115 |
| | Bands TDD_E | | -117.5 | -114 | -114 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ Note4 | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands TDD_C | | -124.5 | -121 | -121 |
| | Bands TDD_E | | -123.5 | -120 | -120 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 | -17.77 | -17.77 |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -90.75+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_C | | -89.75+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_E | | -88.75+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.2.50.2-2: 5 DL TDD RSRQ carrier aggregation test parameters for cell 4 and cell 5**

| Parameter | Unit | Cell 4 | Cell 5 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 4 | 5 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration Note1 | | 6 | 6 |
| Uplink-downlink configuration Note1 | | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note2] | | | | |
| OCNG_RB[Note2] | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -116 | -116 |
| | Bands TDD_C | | -115 | -115 |
| | Bands TDD_E | | -114 | -114 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ [Note4] | | dB | -6.0 | -6.0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -122 | -122 |
| | Bands TDD_C | | -121 | -121 |
| | Bands TDD_E | | -120 | -120 |
| RSRQ[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 | -17.77 |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_C | | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands TDD_E | | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | 0 | 0 |
| Time alignment error relative to cell 1 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 [Note 7] | | | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 [Note 7] | | | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

| | |
|---|---|
| Note 3: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 4: | Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs. |
| Note 7: | Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation. |
| Note 8: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.2.50.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on SCC4 shall fulfil the requirements defined in clause 9.1.11.2.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC3 for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC4 for Cell 5 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.2.51 FS3 Intra frequency absolute and relative RSRQ accuracies with FDD PCell

### A.9.2.51.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD intra frequency RSRQ absolute and relative measurement accuracies in carrier aggregation with frame structure 3 in the configured DMTC occasion are within the specified limits. This test will verify the absolute RSRQ accuracy requirement of the secondary component carrier defined in clause 9.1.19.2. The test will also verify the primary and secondary component carrier relative RSRQ accuracy requirement defined in Clause 9.1.19.4.

### A.9.2.51.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier with frame structure 3 and activated, and Cell3 is the neighboring cell on the same secondary component carrier of Cell2. The test parameters are given in Table A.9.2.51.2-1. The DMTC configuration for Cell2 and Cell3 is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.51.2-1: Test parameters for FDD RSRQ accuracies of Scell with FS3**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25 10MHz: $N_{RB,c}$ = 50 20MHz: $N_{RB,c}$ = 100 | 20 | 20 |
| DMTC period | ms | N/A | 40 | 40 |
| DMTC period offset | | N/A | 10 | 10 |
| Discovery signal occasion duration | ms | N/A | 1 | 1 |
| LBT model | | N/A | N/A | A.3.17 |
| Timing offset to cell1 | µs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15 10MHz: 22-27 20MHz: 47-52 | 47-52 | 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz: R.5 FDD 10MHz: R.0 FDD 20MHz: R.4 FDD | R.0 FS3 | - |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17 10MHz: 13-36 20MHz: 38-61 | 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz: R.11 FDD 10MHz: R.6 FDD 20MHz: R.10 FDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2 | | 5MHz: OP.15 FDD 10MHz: OP.1 FDD 20MHz: OP.11 FDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -119 | | |
| | Bands FDD_C | | -118.5 | | |
| | Bands FDD_D | | -118 | | |
| | Bands FDD_E, FDD_F Note 6 | | -117.5 | | |
| | Bands FDD_G | | -116.5 | | |
| | Bands FDD_H | | -116 | | |
| | Bands FS3_G | | - | ($N_{oc}$ for Channel 1 +3.5dB) | |
| $\hat{E}_s/I_{ot}$ | | dB | -4 | -5.46Note9 | -5.46 |
| RSRPNote3 | Bands FDD_A | dBm/15 kHz | -123.5 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -123 | | |
| | Bands FDD_C | | -122.5 | | |
| | Bands FDD_D | | -122 | | |
| | Bands FDD_E, FDD_F Note 6 | | -121.5 | | |
| | Bands FDD_G | | -120.5 | | |
| | Bands FDD_H | | -120 | | |
| | Bands FS3_G | | - | (RSRP for Cell 1 +3.5dB) | (RSRP for Cell 1 +3.5dB) |
| RSRQNote3 | Bands FDD_A | dBm/15 kHz | -16.25 | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| | Bands FS3_G | | - | -17.34Note9 | -17.34 |
| IoNote3 | Bands FDD_A | 5MHz: dBm/4.5MHz<br>10MHz: dBm/9MHz<br>20MHz: dBm/18MHz | -90.26 +10log($N_{RB,c}$/50) | - | |
| | Bands FDD_B1, FDD_B2 Note 10 | | -89.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_C | | -89.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_D | | -88.76 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_E, FDD_F Note 6 | | -88.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_G | | -87.26 +10log($N_{RB,c}$/50) | | |
| | Bands FDD_H | | -86.76 +10log($N_{RB,c}$/50) | | |
| | Bands FS3_G | | - | (Io for Channel 1 +4.59dBNote9) | (Io for Channel 1 +4.59dB) |
| $\hat{E}_s/N_{oc}$ | | dB | -4 | -4 | -4 |
| Propagation condition | | - | AWGN | | |

Note 1: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz
Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: The value is corresponding to DRS transmission through LBT operation in Cell3.
Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.51.3 Test Requirements

In the test, the performance of RSRQ measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency RSRQ measurements for Cell 3 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.19.4.

## A.9.2.52 FS3 Intra frequency absolute and relative RSRQ accuracies with TDD PCell

### A.9.2.52.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD intra frequency RSRQ absolute and relative measurement accuracies in carrier aggregation with frame structure 3 in the configured DMTC occasion are within the specified limits. This test will verify the absolute RSRQ accuracy requirement of the secondary component carrier defined in clause 9.1.19.2. The test will also verify the primary and secondary component carrier relative RSRQ accuracy requirement defined in Clause 9.1.19.4.

### A.9.2.52.2 Test parameters

In this test case, Cell1 is PCell on the primary component carrier, Cell2 is SCell on the secondary component carrier with frame structure 3 and activated, and Cell3 is the neighboring cell on the same secondary component carrier of Cell2. The test parameters are given in Table A.9.2.52.2-1. The DMTC configuration for Cell2 and Cell3 is provided to the UE in the *measDS-Config* before the start of the test.

**Table A.9.2.52.2-1: Test parameters for FDD RSRQ accuracies of Scell with FS3**

| Parameter | Unit | Test 1 | | |
|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell3 |
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 20 | 20 |
| DMTC period | ms | N/A | 40 | 40 |
| DMTC period offset | | N/A | 10 | 10 |

| | | | | | |
|---|---|---|---|---|---|
| Discovery signal occasion duration | | ms | N/A | 1 | 1 |
| LBT model | | | N/A | N/A | A.3.17 |
| Special subframe configuration[Note1] | | | 6 | N/A | N/A |
| Uplink/downlink configuration[Note1] | | | 1 | N/A | N/A |
| Timing offset to cell1 | | μs | - | 0 | 3 |
| Time alignment error between cell 2 and cell 1 | | | - | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | - |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 47-52 | 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | R.0 FS3 | - |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 38-61 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | R.0 FS3 | R.0 FS3 |
| OCNG Patterns defined in A.3.2 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | OP.13 FDD | OP.14 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA [Note2] | | | | | |
| OCNG_RB [Note2] | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -119.5 | - | |
| | Bands TDD_C | | -118.5 | | |
| | Bands TDD_E | | -117.5 | | |
| | Bands FS3_G | | - | ($N_{oc}$ for Channel 1 +3.5dB) | |
| $\hat{E}_s/I_{ot}$ | | dB | -4 | -5.52[Note9] | -5.52 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -123.5 | - | |
| | Bands TDD_C | | -122.5 | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands TDD_E | | -121.5 | | |
| | Bands FS3_G | | - | (RSRP for Cell 1 +3.5dB) | (RSRP for Cell 1 +3.5dB) |
| RSRQ[Note4] | Bands TDD_A | dBm/15 kHz | -16.25 | - | |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| | Bands FS3_G | | - | -17.34 [Note9] | -17.34 |
| Io[Note4] | Bands TDD_A | 5MHz: dBm/4.5MHz<br>10MHz: dBm/9MHz<br>20MHz: dBm/18MHz | -90.26 +10log($N_{RB,c}$/50) | - | |
| | Bands TDD_C | | -89.26 +10log($N_{RB,c}$/50) | | |
| | Bands TDD_E | | -88.26 +10log($N_{RB,c}$/50) | | |
| | Bands FS3_G | | - | (Io for Channel 1 +4.59dB[Note9]) | (Io for Channel 1 +4.59dB) |
| $\hat{E}_s / N_{oc}$ | | dB | -4 | -4 | -4 |
| Propagation condition | | - | AWGN | | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. For cells with LBT model, OCNG is transmitted only in subframes with downlink transmission bursts, and is not transmitted during muted subframes or during DMTC windows.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 7: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: The value is corresponding to DRS transmission through LBT operation in Cell3.

### A.9.2.52.3 Test Requirements

In the test, the performance of RSRQ measurements is verified from following three perspectives:

- The absolute accuracy of intra-frequency RSRQ measurements for Cell 3 on the secondary component carrier with frame structure 3 shall fulfil the requirements defined in clause 9.1.19.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.19.4.

## A.9.2.53 4DL FDD RSRQ for E-UTRAN in Carrier Aggregation

### A.9.2.53.1 Test Purpose and Environment

The purpose of this test is to verify that the FDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.53.2 Test parameters

In this set of test cases the PCell and the SCells are on different carrier frequencies. There are five cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carriers are tested by using test parameters specified in Table A.9.2.53.2-1 and Table A.9.2.53.2-2. In the test, Cell 1 is the PCell, Cell 2, Cell 3 and Cell 4 are the SCells on secondary component carrier SCC1, SCC2 and SCC3 respectively. The SCC1, SCC2 and SCC3 are configured and activated.

**Table A.9.2.53.2-1: 4 DL FDD RSRQ carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | 3 |
| $BW_{channel}$ | | MHz | 5MHz:$N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz:$N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz:10-15<br>10MHz:22-27<br>20MHz:47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 | 5MHz:7-17<br>10MHz:13-36<br>20MHz:38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -119 | -115.5 | -115.5 |
| | Bands FDD_C | | -118.5 | -115 | -115 |
| | Bands FDD_D | | -118 | -114.5 | -114.5 |
| | Bands FDD_E, FDD_F Note 6 | | -117.5 | -114 | -114 |
| | Bands FDD_G | | -116.5 | -113 | -113 |
| | Bands FDD_H | | -116 | -112.5 | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ Note3 | | dB | -6.0 | -6.0 | -6.0 |
| RSRP Note3 | Bands FDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -125 | -121.5 | -121.5 |
| | Bands FDD_C | | -124.5 | -121 | -121 |
| | Bands FDD_D | | -124 | -120.5 | -120.5 |
| | Bands FDD_E, FDD_F Note 6 | | -123.5 | -120 | -120 |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_G | | -122.5 | -119 | -119 |
| | Bands FDD_H | | -122 | -118.5 | -118.5 |
| RSRQ Note3 | Bands FDD_A | dB | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A | dBm/ $BW_{channel}$ | -90.75+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_B1, FDD_B2 Note 9 | | -90.25+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) | -86.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_C | | -89.75+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_D | | -89.25+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) | -85.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_E, FDD_F Note 6 | | -88.75+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) | -85.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_G | | -87.75+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) | -84.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_H | | -87.25+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) | -83.75+ 10log($N_{RB,c}$ /50) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.

Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.

Note 8: E-UTRA operating band groups are as defined in Section 3.5.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.2.53.2-2: 4 DL FDD RSRQ carrier aggregation test parameters for cell 4**

| Parameter | Unit | Cell 4 |
|---|---|---|
| E-UTRA RF Channel Number | | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz:R.5 FDD<br>10MHz:R.0 FDD<br>20MHz:R.4 FDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz:7-17<br>10MHz:13-36 |

| | | | |
|---|---|---|---|
| | | | 20MHz:38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz:R.11 FDD<br>10MHz:R.6 FDD<br>20MHz:R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz:OP.15 FDD<br>10MHz:OP.1 FDD<br>20MHz:OP.11 FDD |
| PBCH_RA | | dB | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note1] | | | |
| OCNG_RB[Note1] | | | |
| $N_{oc}$ [Note2] | Bands FDD_A | dBm/15 kHz | -116 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -115.5 |
| | Bands FDD_C | | -115 |
| | Bands FDD_D | | -114.5 |
| | Bands FDD_E, FDD_F [Note 6] | | -114 |
| | Bands FDD_G | | -113 |
| | Bands FDD_H | | -112.5 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 |
| $\hat{E}_s / I_{ot}$ [Note3] | | dB | -6.0 |
| RSRP[Note3] | Bands FDD_A | dBm/15 kHz | -122 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -121.5 |
| | Bands FDD_C | | -121 |
| | Bands FDD_D | | -120.5 |
| | Bands FDD_E, FDD_F [Note 6] | | -120 |
| | Bands FDD_G | | -119 |
| | Bands FDD_H | | -118.5 |
| RSRQ[Note3] | Bands FDD_A | dB | -17.77 |
| | Bands FDD_B1, FDD_B2 [Note 9] | | |
| | Bands FDD_C | | |
| | Bands FDD_D | | |
| | Bands FDD_E, FDD_F [Note 6] | | |
| | Bands FDD_G | | |
| | Bands FDD_H | | |
| Io[Note3] | Bands FDD_A | dBm/ $BW_{channel}$ | -87.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_B1, FDD_B2 [Note 9] | | -86.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_C | | -86.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_D | | -85.75+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_E, FDD_F [Note 6] | | -85.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_G | | -84.25+ 10log($N_{RB,c}$ /50) |
| | Bands FDD_H | | -83.75+ |

| | | | |
|---|---|---|---|
| | | | $10\log(N_{RB,c}/50)$ |
| Propagation condition | | - | AWGN |
| Antenna Configuration | | - | 1x2 |
| Timing offset to Cell 1 | | µs | 0 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 3 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 4 Note 7 | | | - |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.53.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC3 for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

## A.9.2.54 4DL TDD RSRQ for E-UTRAN in Carrier Aggregation

### A.9.2.54.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

### A.9.2.54.2 Test parameters

In this set of test cases the PCell and the SCells are on different carrier frequencies. There are five cells used in this test case. Both RSRQ absolute and relative accuracy requirements of the primary and secondary component carriers are tested by using test parameters specified in Table A.9.2.54.2-1 and Table A.9.2.54.2-2. In the test, Cell 1 is the PCell, Cell 2, Cell 3 and Cell 4 are the SCells on secondary component carrier SCC1, SCC2 and SCC3 respectively. The SCC1, SCC2 and SCC3 are configured and activated.

**Table A.9.2.54.2-1: 4 DL TDD RSRQ carrier aggregation test parameters for cell 1, cell 2 and cell 3**

| Parameter | | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | 2 | 3 |
| $BW_{channel}$ | | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 54<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 54<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 54<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration[Note1] | | | 6 | | |
| Uplink-downlink configuration[Note1] | | | 1 | | |
| Measurement bandwidth | | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD |
| OCNG Patterns defined in A.3.2.1 | | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -119.5 | -116 | -116 |
| | Bands TDD_C | | -118.5 | -115 | -115 |
| | Bands TDD_E | | -117.5 | -114 | -114 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ [Note4] | | dB | -6.0 | -6.0 | -6.0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -125.5 | -122 | -122 |
| | Bands TDD_C | | -124.5 | -121 | -121 |
| | Bands TDD_E | | -123.5 | -120 | -120 |
| RSRQ[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 | -17.77 | -17.77 |
| Io[Note4] | Bands TDD_A | | -90.75+ | -87.25+ | -87.25+ |

| | | | | | |
|---|---|---|---|---|---|
| | | dBm/ $BW_{channel}$ | 10log($N_{RB,c}$ /54) | 10log($N_{RB,c}$ /54) | 10log($N_{RB,c}$ /54) |
| | Bands TDD_C | | -89.75+ 10log($N_{RB,c}$ /54) | -86.25+ 10log($N_{RB,c}$ /54) | -86.25+ 10log($N_{RB,c}$ /54) |
| | Bands TDD_E | | -88.75+ 10log($N_{RB,c}$ /54) | -85.25+ 10log($N_{RB,c}$ /54) | -85.25+ 10log($N_{RB,c}$ /54) |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | µs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 7 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.2.54.2-2: 4 DL TDD RSRQ carrier aggregation test parameters for cell 4**

| Parameter | Unit | Cell 4 |
|---|---|---|
| E-UTRA RF Channel Number | | 4 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 54<br>20MHz: $N_{RB,c}$ = 100 |
| Special subframe configuration Note1 | | 6 |
| Uplink-downlink configuration Note1 | | 1 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz:R.11 TDD<br>10MHz:R.6 TDD<br>20MHz:R.10 TDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | | |
| PSS_RA | | |
| SSS_RA | | |
| PCFICH_RB | | |
| PHICH_RA | | |
| PHICH_RB | | |
| PDCCH_RA | | |
| PDCCH_RB | | |
| PDSCH_RA | | |

| | | | |
|---|---|---|---|
| PDSCH_RB | | | |
| OCNG_RA Note2 | | | |
| OCNG_RB Note2 | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -116 |
| | Bands TDD_C | | -115 |
| | Bands TDD_E | | -114 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 |
| $\hat{E}_s / I_{ot}$ Note4 | | dB | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -122 |
| | Bands TDD_C | | -121 |
| | Bands TDD_E | | -120 |
| RSRQ Note4 | Bands TDD_A, TDD_C, TDD_E | dB | -17.77 |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25+ 10log($N_{RB,c}$ /54) |
| | Bands TDD_C | | -86.25+ 10log($N_{RB,c}$ /54) |
| | Bands TDD_E | | -85.25+ 10log($N_{RB,c}$ /54) |
| Propagation condition | | - | AWGN |
| Antenna Configuration | | - | 1x2 |
| Timing offset to Cell 1 | | μs | 0 |
| Time alignment error relative to cell 1 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 2 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 3 Note 7 | | | ≤ TAE |
| Time alignment error relative to cell 4 Note 7 | | | - |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: Es/Iot, RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 7: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 8: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.2.54.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements defined in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on SCC1 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on SCC2 shall fulfil the requirements defined in clause 9.1.11.2.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on SCC3 shall fulfil the requirements defined in clause 9.1.11.2.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC1 for Cell 2 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC2 for Cell 3 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary component carrier and SCC3 for Cell 4 relative to Cell 1 shall fulfil the requirements defined in clause 9.1.11.3.

# A.9.2.55 3 DL RSRQ for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.2.55.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carrier specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.2.38, A.9.2.39, A.9.2.40, A.9.2.41, does not need to be tested in the generic duplex-mode test case A.9.2.55.

## A.9.2.55.2 Test parameters

In this set of test cases there are three cells on three carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, and Cell 3 is activated SCell on channel 3. The parameters for the test are listed in Table A.9.2.55.2-1.

**Table A.9.2.55.2-1: 3 DL RSRQ for E-UTRAN in Carrier Aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 |
| Duplex mode | | FDD or TDD | FDD or TDD | FDD or TDD |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| TDD Special subframe configuration[Note1] | | 6 | 6 | 6 |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD | 5MHz FDD: R.11 FDD<br>10MHz FDD: R.6 FDD<br>20MHz FDD: R.10 FDD<br><br>5MHz TDD: R.11 TDD<br>10MHz TDD: R.6 TDD<br>20MHz TDD: R.10 TDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD | 5MHz FDD: OP.15 FDD<br>10MHz FDD: OP.1 FDD<br>20MHz FDD: OP.11 FDD<br><br>5MHz TDD: OP.9 TDD<br>10MHz TDD: OP.1 TDD<br>20MHz TDD: OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | -116 | -116 |
| | Bands TDD_C | | -115 | -115 | -115 |
| | Bands TDD_E | | -114 | -114 | -114 |
| | Bands FDD_A | | -119.5 | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | -119 | -119 |
| | Bands FDD_C | | -118.5 | -118.5 | -118.5 |
| | Bands FDD_D | | -118 | -118 | -118 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | -117.5 | -117.5 |
| | Bands FDD_G | | -116.5 | -116.5 | -116.5 |
| | Bands FDD_H | | -116 | -116 | -116 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 | -6.0 |

| | | | | | |
|---|---|---|---|---|---|
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -122 | -122 | -122 |
| | Bands TDD_C | | -121 | -121 | -121 |
| | Bands TDD_E | | -120 | -120 | -120 |
| | Bands FDD_A | | -125.5 | -125.5 | -125.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -125 | -125 | -125 |
| | Bands FDD_C | | -124.5 | -124.5 | -124.5 |
| | Bands FDD_D | | -124 | -124 | -124 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | -123.5 | -123.5 |
| | Bands FDD_G | | -122.5 | -122.5 | -122.5 |
| | Bands FDD_H | | -122 | -122 | -122 |
| RSRQ Note4 | Bands TDD_A | dB | -17.77 | -17.77 | -17.77 |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| | Bands FDD_A | | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | |
| | Bands FDD_G | | | | |
| | Bands FDD_H | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | s |
| | Bands FDD_B1, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_E, | | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_F Note 6 | | | | |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| Propagation Condition | | | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.55.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.56 4 DL RSRQ for E-UTRAN in Carrier Aggregation with generic duplex modes

### A.9.2.56.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ

measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.2.45, A.9.2.46, A.9.2.53 A.9.2.54, does not need to be tested in the generic duplex-mode test case A.9.2.56.

### A.9.2.56.2 Test parameters

In this set of test cases there are four cells on four carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, and Cell 4 is activated SCell on channel 4. The parameters for the test are listed in Table A.9.2.56.2-1.

**Table A.9.2.56.2-1: 4 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 |
| Duplex mode | | FDD or TDD | FDD or TDD | FDD or TDD | FDD or TDD |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| TDD Special subframe configuration[Note1] | | 6 | 6 | 6 | 6 |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2 | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD | 5MHz TDD: OP.9 TDD 10MHz TDD: OP.1 TDD 20MHz TDD: OP.7 TDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note2<br>OCNG_RB Note2 | | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | -116 | -116 | -116 |
| | Bands TDD_C | | -115 | -115 | -115 | -115 |
| | Bands TDD_E | | -114 | -114 | -114 | -114 |
| | Bands FDD_A | | -119.5 | -119.5 | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | -119 | -119 | -119 |
| | Bands FDD_C | | -118.5 | -118.5 | -118.5 | -118.5 |
| | Bands FDD_D | | -118 | -118 | -118 | -118 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | -117.5 | -117.5 | -117.5 |
| | Bands FDD_G | | -116.5 | -116.5 | -116.5 | -116.5 |
| | Bands FDD_H | | -116 | -116 | -116 | -116 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -122 | -122 | -122 | -122 |
| | Bands TDD_C | | -121 | -121 | -121 | -121 |
| | Bands TDD_E | | -120 | -120 | -120 | -120 |
| | Bands FDD_A | | -125.5 | -125.5 | -125.5 | -125.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -125 | -125 | -125 | -125 |
| | Bands FDD_C | | -124.5 | -124.5 | -124.5 | -124.5 |
| | Bands FDD_D | | -124 | -124 | -124 | -124 |
| | Bands FDD_E, | | -123.5 | -123.5 | -123.5 | -123.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Bands FDD_F Note 6 | | | | | |
| | Bands FDD_G | | -122.5 | -122.5 | -122.5 | -122.5 |
| | Bands FDD_H | | -122 | -122 | -122 | -122 |
| RSRQ[Note4] | Bands TDD_A | dB | -17.77 | -17.77 | -17.77 | -17.77 |
| | Bands TDD_C | | | | | |
| | Bands TDD_E | | | | | |
| | Bands FDD_A | | -17.77 | -17.77 | -17.77 | -17.77 |
| | Bands FDD_B1, FDD_B2 Note 11 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | | |
| | Bands FDD_G | | | | | |
| | Bands FDD_H | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_B1, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) |
| Propagation Condition | | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | | 1x2 | 1x2 | 1x2 | 1x2 |
| Timing offset to Cell 1 | | μs | - | 0 | 0 | 0 |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE |
| Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.<br>Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | |

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void.
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.56.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

## A.9.2.57 5 DL RSRQ for E-UTRAN in Carrier Aggregation with generic duplex modes

### A.9.2.57.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

Note on the applicability: the requirement tested in the specific duplex-mode test cases A.9.2.47, A.9.2.48, A.9.2.49 A.9.2.50, does not need to be tested in the generic duplex-mode test case A.9.2.57.

### A.9.2.57.2 Test parameters

In this set of test cases there are five cells on five carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, Cell 4 is activated SCell on channel 4, and Cell 5 is activated SCell on channel 5. The parameters for the test are listed in Table A.9.2.57.2-1.

**Table A.9.2.57.2-1: 5 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation test parameters**

| Parameter | Unit | Cell 1 | Cells | | | |
|---|---|---|---|---|---|---|
| | | | 2 | 3 | 4 | 5 |
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 | 5 |
| Duplex mode | | FDD or TDD | FDD or TDD | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | |
| TDD Special subframe configuration[Note1] | | 6 | 6 | | | |
| TDD Uplink/downlink configuration[Note1] | | 1 | 1 | | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | | |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | | | |
| PDSCH allocation | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | | | |
| OCNG Patterns defined in A.3.2 | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | | | |
| PBCH_RA | dB | 0 | 0 | | | |
| PBCH_RB | | | | | | |
| PSS_RA | | | | | | |
| SSS_RA | | | | | | |
| PCFICH_RB | | | | | | |
| PHICH_RA | | | | | | |
| PHICH_RB | | | | | | |
| PDCCH_RA | | | | | | |
| PDCCH_RB | | | | | | |

| | | | | |
|---|---|---|---|---|
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | -116 |
| | Bands TDD_C | | -115 | -115 |
| | Bands TDD_E | | -114 | -114 |
| | Bands FDD_A | | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | -119 |
| | Bands FDD_C | | -118.5 | -118.5 |
| | Bands FDD_D | | -118 | -118 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | -117.5 |
| | Bands FDD_G | | -116.5 | -116.5 |
| | Bands FDD_H | | -116 | -116 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -122 | -122 |
| | Bands TDD_C | | -121 | -121 |
| | Bands TDD_E | | -120 | -120 |
| | Bands FDD_A | | -125.5 | -125.5 |
| | Bands FDD_B, FDD_B2 Note 11 | | -125 | -125 |
| | Bands FDD_C | | -124.5 | -124.5 |
| | Bands FDD_D | | -124 | -124 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | -123.5 |
| | Bands FDD_G | | -122.5 | -122.5 |
| | Bands FDD_H | | -122 | -122 |
| RSRQ Note4 | Bands TDD_A | dB | -17.77 | -17.77 |
| | Bands TDD_C | | | |
| | Bands TDD_E | | | |
| | Bands FDD_A | | -17.77 | -17.77 |
| | Bands FDD_B, FDD_B2 Note 11 | | | |
| | Bands FDD_C | | | |
| | Bands FDD_D | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | |
| | Bands FDD_G | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Bands FDD_H | | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_B, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | | | |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | |
| Propagation Condition | | | AWGN | AWGN | | | |
| Antenna Configuration | | | 1x2 | 1x2 | | | |
| Timing offset to Cell 1 | | µs | - | 0 | | | |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 4 Note 10 | | | - | - | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.57.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 5 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.58 6 DL RSRQ for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.2.58.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.58.2 Test parameters

In this set of test cases there are six cells on six carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, Cell 4 is activated SCell on channel 4, Cell 5 is activated SCell on channel 5 and Cell 6 is activated SCell on channel 6. The parameters for the test are listed in Table A.9.2.58.2-1.

**Table A.9.2.58.2-1: 6 DL RSRQ for E-UTRAN in Carrier Aggregation test parameters**

| Parameter | Unit | Cell 1 | Cells | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2 | 3 | 4 | 5 | 6 |
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 | 5 | 6 |
| Duplex mode | | FDD or TDD | FDD or TDD | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | |
| TDD Special subframe configuration[Note1] | | - | 6 | | | | |
| TDD uplink/downlink configuration[Note1] | | - | 1 | | | | |
| Measurement bandwidth | $n_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | | | |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD | | | | |

| | | | | |
|---|---|---|---|---|
| | | | 5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD |
| PDSCH allocation | | $n_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD |
| OCNG Patterns defined in A.3.2 | | | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 5MHz FDD:<br>OP.15 FDD<br>10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | -116 |
| | Bands TDD_C | | -115 | -115 |
| | Bands TDD_E | | -114 | -114 |
| | Bands FDD_A | | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | -119 |
| | Bands FDD_C | | -118.5 | -118.5 |
| | Bands FDD_D | | -118 | -118 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | -117.5 |
| | Bands FDD_G | | -116.5 | -116.5 |
| | Bands FDD_H | | -116 | -116 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/I_{ot}$ | | dB | -6.0 | -6.0 | | | | |
| RSRP[Note4] | Bands TDD_A | dBm/ 15kHz | -122 | -122 | | | | |
| | Bands TDD_C | | -121 | -121 | | | | |
| | Bands TDD_E | | -120 | -120 | | | | |
| | Bands FDD_A | | -125.5 | -125.5 | | | | |
| | Bands FDD_B, FDD_B2 [Note 11] | | -125 | -125 | | | | |
| | Bands FDD_C | | -124.5 | -124.5 | | | | |
| | Bands FDD_D | | -124 | -124 | | | | |
| | Bands FDD_E, Bands FDD_F [Note 6] | | -123.5 | -123.5 | | | | |
| | Bands FDD_G | | -122.5 | -122.5 | | | | |
| | Bands FDD_H | | -122 | -122 | | | | |
| RSRQ[Note4] | Bands TDD_A | dB | -17.77 | -17.77 | | | | |
| | Bands TDD_C | | | | | | | |
| | Bands TDD_E | | | | | | | |
| | Bands FDD_A | | -17.77 | -17.77 | | | | |
| | Bands FDD_B, FDD_B2 [Note 11] | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, Bands FDD_F [Note 6] | | | | | | | |
| | Bands FDD_G | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io[Note4] | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | | |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | | | | |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_B, FDD_B2 [Note 11] | | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_E, Bands FDD_F [Note 6] | | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | | | | |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | | |
| Propagation Condition | | | AWGN | AWGN | | | | |
| Antenna Configuration | | | 1x2 | 1x2 | | | | |
| Timing offset to Cell 1 | | µs | - | 0 | | | | |
| Time alignment error relative to cell 1 [Note 10] | | | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 [Note 10] | | | - | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 [Note 10] | | | - | - | - | ≤ TAE | ≤ TAE | ≤ TAE |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time alignment error relative to cell 4 Note 10 | | - | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 10 | | - | - | - | - | - | ≤ TAE |
| Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.<br>Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.<br>Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.<br>Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.<br>Note 8: Void<br>Note 9: E-UTRA operating band groups are as defined in Section 3.5.<br>Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.<br>Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. | | | | | | | |

### A.9.2.58.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The absolute accuracy of intra-frequency RSRQ measurements of Cell 6 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 5 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.
- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.59 7 DL RSRQ for E-UTRAN in Carrier Aggregation with generic duplex modes

## A.9.2.59.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy in carrier aggregation is within the specified limits under AWGN propagation conditions. This test will verify the absolute accuracy of intra-frequency RSRQ measurements for the primary component carrier specified in clause 9.1.11.1, the absolute accuracy of intra-frequency RSRQ measurements for the secondary component carriers specified in clause 9.1.11.2 and also the relative inter-frequency RSRQ accuracy requirement between primary and secondary component carriers specified in clause 9.1.11.3.

## A.9.2.59.2 Test parameters

In this set of test cases there are seven cells on seven carrier frequencies. Cell 1 is PCell on channel 1, Cell 2 is activated SCell on channel 2, Cell 3 is activated SCell on channel 3, Cell 4 is activated SCell on channel 4, Cell 5 is activated SCell on channel 5, Cell 6 is activated SCell on channel 6 and Cell 7 is activated SCell on channel 7. The parameters for the test are listed in Table A.9.2.59.2-1.

**Table A.9.2.59.2-1: 7 DL RSRQ for E-UTRAN in Carrier Aggregation test parameters**

| Parameter | Unit | Cell 1 | Cells | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2 | 3 | 4 | 5 | 6 | 7 |
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Duplex mode | | FDD or TDD | FDD or TDD | | | | | |
| $BW_{channel}$ | | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | | | | | |
| TDD Special subframe configuration[Note1] | | - | 6 | | | | | |
| TDD uplink/downlink configuration[Note1] | | - | 1 | | | | | |
| Measurement bandwidth | $\eta_{PRB}$ | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | 5MHz: 10-15<br>10MHz: 22-27<br>20MHz: 47-52 | | | | | |
| PDSCH Reference measurement channel defined in A.3.1.1 | | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | 5MHz FDD:<br>R.5 FDD<br>10MHz FDD:<br>R.0 FDD<br>20MHz FDD:<br>R.4 FDD<br><br>5MHz TDD:<br>R.4 TDD<br>10MHz TDD:<br>R.0 TDD<br>20MHz TDD:<br>R.3 TDD | | | | | |
| PDSCH allocation | $\eta_{PRB}$ | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | 5MHz: 7-17<br>10MHz: 13-36<br>20MHz: 38-61 | | | | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2 | | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | 5MHz FDD:<br>R.11 FDD<br>10MHz FDD:<br>R.6 FDD<br>20MHz FDD:<br>R.10 FDD<br><br>5MHz TDD:<br>R.11 TDD<br>10MHz TDD:<br>R.6 TDD<br>20MHz TDD:<br>R.10 TDD | | | | | |
| OCNG Patterns defined in A.3.2 | | 5MHz FDD:<br>OP.15 FDD | 5MHz FDD:<br>OP.15 FDD | | | | | |

| | | | | |
|---|---|---|---|---|
| | | | 10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD | 10MHz FDD:<br>OP.1 FDD<br>20MHz FDD:<br>OP.11 FDD<br><br>5MHz TDD:<br>OP.9 TDD<br>10MHz TDD:<br>OP.1 TDD<br>20MHz TDD:<br>OP.7 TDD |
| PBCH_RA | | dB | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note2 | | | | |
| OCNG_RB Note2 | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/ 15kHz | -116 | -116 |
| | Bands TDD_C | | -115 | -115 |
| | Bands TDD_E | | -114 | -114 |
| | Bands FDD_A | | -119.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 11 | | -119 | -119 |
| | Bands FDD_C | | -118.5 | -118.5 |
| | Bands FDD_D | | -118 | -118 |
| | Bands FDD_E, Bands FDD_F Note 6 | | -117.5 | -117.5 |
| | Bands FDD_G | | -116.5 | -116.5 |
| | Bands FDD_H | | -116 | -116 |
| $\hat{E}_s / N_{oc}$ | | dB | -6.0 | -6.0 |
| $\hat{E}_s / I_{ot}$ | | dB | -6.0 | -6.0 |
| RSRP Note4 | Bands TDD_A | dBm/ 15kHz | -122 | -122 |
| | Bands TDD_C | | -121 | -121 |
| | Bands TDD_E | | -120 | -120 |
| | Bands FDD_A | | -125.5 | -125.5 |
| | Bands FDD_B, FDD_B2 Note 11 | | -125 | -125 |
| | Bands FDD_C | | -124.5 | -124.5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Bands FDD_D | | -124 | -124 | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | -123.5 | -123.5 | | | | | |
| | Bands FDD_G | | -122.5 | -122.5 | | | | | |
| | Bands FDD_H | | -122 | -122 | | | | | |
| RSRQ Note4 | Bands TDD_A | dB | -17.77 | -17.77 | | | | | |
| | Bands TDD_C | | | | | | | | |
| | Bands TDD_E | | | | | | | | |
| | Bands FDD_A | | -17.77 | -17.77 | | | | | |
| | Bands FDD_B, FDD_B2 Note 11 | | | | | | | | |
| | Bands FDD_C | | | | | | | | |
| | Bands FDD_D | | | | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | | | | | | | |
| | Bands FDD_G | | | | | | | | |
| | Bands FDD_H | | | | | | | | |
| Io Note4 | Bands TDD_A | dBm/ $BW_{channel}$ | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands TDD_C | | -86.25 + 10log($N_{RB,c}$/50) | -86.25 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands TDD_E | | -85.25 + 10log($N_{RB,c}$/50) | -85.25 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_A | | -90.75 + 10log($N_{RB,c}$/50) | -90.75 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_B, FDD_B2 Note 11 | | -90.25 + 10log($N_{RB,c}$/50) | -90.25 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_C | | -89.75 + 10log($N_{RB,c}$/50) | -89.75 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_D | | -89.25 + 10log($N_{RB,c}$/50) | -89.25 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_E, Bands FDD_F Note 6 | | -88.75 + 10log($N_{RB,c}$/50) | -88.75 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_G | | -87.75 + 10log($N_{RB,c}$/50) | -87.75 + 10log($N_{RB,c}$/50) | | | | | |
| | Bands FDD_H | | -87.25 + 10log($N_{RB,c}$/50) | -87.25 + 10log($N_{RB,c}$/50) | | | | | |
| Propagation Condition | | | AWGN | AWGN | | | | | |
| Antenna Configuration | | | 1x2 | 1x2 | | | | | |
| Timing offset to Cell 1 | | µs | - | 0 | | | | | |
| Time alignment error relative to cell 1 Note 10 | | | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 2 Note 10 | | | - | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 3 Note 10 | | | - | - | - | ≤ TAE | ≤ TAE | ≤ TAE | ≤ TAE |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time alignment error relative to cell 4 Note 10 | | - | - | - | - | ≤ TAE | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 5 Note 10 | | - | - | - | - | - | ≤ TAE | ≤ TAE |
| Time alignment error relative to cell 6 Note 10 | | - | - | - | - | - | - | ≤ TAE |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 7: The selection of the bands for testing depends on the configuration of the carrier aggregation supported by the UEs.
Note 8: Void
Note 9: E-UTRA operating band groups are as defined in Section 3.5.
Note 10: Time alignment error (TAE) as specified in TS 36.104 [30] clause 6.5.3.1. The TAE value depends upon the type of carrier aggregation.
Note 11: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.59.3 Test Requirements

In the test, the RSRQ measurement accuracy in carrier aggregation shall fulfil the requirements in clause 9.1.11.1, 9.1.11.2, and 9.1.11.3.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 1 on the primary component carrier shall fulfil the requirements specified in clause 9.1.11.1.

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 2 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 3 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 4 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 5 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 6 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The absolute accuracy of intra-frequency RSRQ measurements of Cell 7 on the secondary component carrier shall fulfil the requirements specified in clause 9.1.11.2

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 2 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 3 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 4 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 5 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 6 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

- The relative accuracy of inter-frequency RSRQ measurements between the primary and secondary component carriers for Cell 7 relative to Cell 1 shall fulfil the requirements specified in clause 9.1.11.3.

# A.9.2.60 FDD Intra frequency case for CA Idle Mode Measurements

## A.9.2.60.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.5B.2.

## A.9.2.60.2 Test parameters

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

In this test case all cells are on the same carrier frequency. The absolute accuracy of RSRQ intra frequency measurement is tested by using the parameters in Table A.9.2.60.2-1. In all test cases, Cell 1 is the serving and Cell 2 the target cell.

**Table A.9.2.60.2-1: RSRQ FDD Intra frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | | 1 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | | 10 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | - | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | [-84.76] | [-84.76] | [-103.85] | [-103.85] | [-116] | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-115.5] | |
| | Bands FDD_C | | | | | | [-115] | |
| | Bands FDD_D | | | | | | [-114.5] | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-114] | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_G Note 7 | | | | | | [-113] | |
| | Bands FDD_H | | | | | | [-112.5] | |
| $\hat{E}_s/I_{ot}$ | | dB | [-1.76] | [-1.76] | [-4.7] | [-4.7] | [-5.46] | [-5.46] |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | [-81.76] | [-81.76] | [-106.75] | [-106.75] | [-120] | [-120] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-119.5] | [-119.5] |
| | Bands FDD_C | | | | | | [-119] | [-119] |
| | Bands FDD_D | | | | | | [-118.5] | [-118.5] |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-118] | [-118] |
| | Bands FDD_G Note 7 | | | | | | [-117] | [-117] |
| | Bands FDD_H | | | | | | [-116.5] | [-116.5] |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | [-14.77] | [-14.77] | [-16.76] | [-16.76] | [-17.34] | [-17.34] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | | |
| | Bands FDD_G Note 7 | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | [-50] | [-50] | [-73] | [-73] | [-85.67] | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-85.17] | |
| | Bands FDD_C | | | | | | [-84.67] | |
| | Bands FDD_D | | | | | | [-84.17] | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-83.67] | |
| | Bands FDD_G Note 7 | | | | | | [-82.67] | |
| | Bands FDD_H | | | | | | [-82.17] | |
| $\hat{E}_s/N_{oc}$ | | dB | [3] | [3] | [-2.9] | [-2.9] | [-4] | [-4] |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.60.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in section 9.1.5B.2.

# A.9.2.61 FDD—FDD Inter frequency case for CA Idle Mode Measurements on overlapping carrier

## A.9.2.61.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6B.2.

## A.9.2.61.2 Test parameters

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

In this test case the two cells are on different carrier frequencies. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.61.2-1. In all tests, Cell 1 is the serving cell and Cell 2 the target cell.

**Table A.9.2.61.2-1: RSRQ FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 | 10 | 10 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | |
| PSS_RA | | | | | | | | |
| SSS_RA | | | | | | | | |
| PCFICH_RB | | | | | | | | |
| PHICH_RA | | | | | | | | |
| PHICH_RB | | | | | | | | |
| PDCCH_RA | | | | | | | | |
| PDCCH_RB | | | | | | | | |
| PDSCH_RA | | | | | | | | |
| PDSCH_RB | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | [-80] | [-80] | [-104.70] | [-104.70] | [-119.5] | [-119.5] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-119] | [-119] |
| | Bands FDD_C | | | | | | [-118.5] | [-118.5] |
| | Bands FDD_D | | | | | | [-118] | [-118] |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-117.5] | [-117.5] |
| | Bands FDD_G Note 7 | | | | | | [-116.5] | [-116.5] |
| | Bands FDD_H | | | | | | [-116] | [-116] |
| $\hat{E}_s / I_{ot}$ | | dB | [-1.75] | [-1.75] | [-4.0] | [-4.0] | [-4.0] | [-4.0] |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | [-81.75] | [-81.75] | [-108.70] | [-108.70] | [-123.5] | [-123.5] |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-123] | [-123] |
| | Bands FDD_C | | | | | | [-122.5] | [-122.5] |
| | Bands FDD_D | | | | | | [-122] | [-122] |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-121.5] | [-121.5] |
| | Bands FDD_G Note 7 | | | | | | [-120.5] | [-120.5] |
| | Bands FDD_H | | | | | | [-120] | [-120] |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | [-14.76] | [-14.76] | [-16.25] | [-16.25] | [-16.25] | [-16.25] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | | | | |
| | Bands FDD_G Note 7 | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | [-50] | [-50] | [-75.46] | [-75.46] | [-90.26] | [-90.26] |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | | [-89.76] | [-89.76] |
| | Bands FDD_C | | | | | | [-89.26] | [-89.26] |
| | Bands FDD_D | | | | | | [-88.76] | [-88.76] |
| | Bands FDD_E, FDD_F Note 5 | | | | | | [-88.26] | [-88.26] |
| | Bands FDD_G Note 7 | | | | | | [-87.26] | [-87.26] |
| | Bands FDD_H | | | | | | [-86.76] | [-86.76] |
| $\hat{E}_s / N_{oc}$ | | dB | [-1.75] | [-1.75] | [-4.0] | [-4.0] | [-4.0] | [-4.0] |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

### A.9.2.61.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in sections 9.1.6B.2.

## A.9.2.62 FDD—FDD Inter frequency case for CA Idle Mode Measurements on non-overlapping carrier

### A.9.2.62.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.6B.3.

### A.9.2.62.2 Test parameters

The requirements in this clause are applicable for a UE:

- in state RRC_IDLE

- that is synchronised to the cell that is measured.

The requirements apply for UE supporting *ca-IdleModeMeasurements*, when configured with *measIdleConfig* and while T331 timer is running.

In this test case the two cells are on different carrier frequencies. Both RSRQ inter frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.2.62.2-1. In all tests, Cell 1 is the serving cell and Cell 2 the target cell.

**Table A.9.2.62.2-1: RSRQ FDD—FDD Inter frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | 2 | 1 | 2 | 1 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 | 10 | 10 | 10 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | | 22—27 | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | | R.6 FDD | | R.6 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD | OP.1 FDD | OP.2 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| $N_{oc}$ [Note2] | Bands FDD_A [Note 8] | dBm/15 kHz | [-80] | [-80] | [-104.70] | [-104.70] 8 | [-119.5] | [-119.5] |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | [-119] | [-119] |
| | Bands FDD_C | | | | | | [-118.5] | [-118.5] |
| | Bands FDD_D | | | | | | [-118] | [-118] |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | [-117.5] | [-117.5] |
| | Bands FDD_G [Note 7] | | | | | | [-116.5] | [-116.5] |
| | Bands FDD_H | | | | | | [-116] | [-116] |
| $\hat{E}_s/I_{ot}$ | | dB | [-1.75] | [-1.75] | [-4.0] | [-4.0] | [-4.0] | [-4.0] |
| RSRP[Note3] | Bands FDD_A [Note 8] | dBm/15 kHz | [-81.75] | [-81.75] | [-108.70] | [-108.70] | [-123.5] | [-123.5] |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | [-123] | [-123] |
| | Bands FDD_C | | | | | | [-122.5] | [-122.5] |
| | Bands FDD_D | | | | | | [-122] | [-122] |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | [-121.5] | [-121.5] |
| | Bands FDD_G [Note 7] | | | | | | [-120.5] | [-120.5] |
| | Bands FDD_H | | | | | | [-120] | [-120] |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RSRQ[Note3] | Bands FDD_A [Note 8] | dB | [-14.76] | [-14.76] | [-16.25] | [-16.25] | [-16.25] | [-16.25] |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | | |
| | Bands FDD_C | | | | | | | |
| | Bands FDD_D | | | | | | | |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | | |
| | Bands FDD_G [Note 7] | | | | | | | |
| | Bands FDD_H | | | | | | | |
| Io[Note3] | Bands FDD_A [Note 8] | dBm/9 MHz | [-50] | [-50] | [-75.46] | [-75.46] | [-90.26] | [-90.26] |
| | Bands FDD_B1, FDD_B2 [Note 9] | | | | | | [-89.76] | [-89.76] |
| | Bands FDD_C | | | | | | [-89.26] | [-89.26] |
| | Bands FDD_D | | | | | | [-88.76] | [-88.76] |
| | Bands FDD_E, FDD_F [Note 5] | | | | | | [-88.26] | [-88.26] |
| | Bands FDD_G [Note 7] | | | | | | [-87.26] | [-87.26] |
| | Bands FDD_H | | | | | | [-86.76] | [-86.76] |
| $\hat{E}_s / N_{oc}$ | | dB | [-1.75] | [-1.75] | [-4.0] | [-4.0] | [-4.0] | [-4.0] |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RSRQ, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.9.2.62.3 Test Requirements

The RSRQ measurement accuracy shall fulfil the requirements in sections 9.1.6B.3.

## A.9.3 UTRAN FDD CPICH RSCP

### A.9.3.1 E-UTRAN FDD

#### A.9.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CPICH RSCP absolute measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.2.1. There are two different test setups with different UTRAN parameters.

#### A.9.3.1.2 Parameters

The test parameters are given in Tables A.9.3.1.2-1, A.9.3.1.2-2 and A.9.3.1.2-3 below.

**Table A.9.3.1.2-1: General test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN FDD carrier frequency is used. |
| UTRAN RF Channel Number | | 1 | One UTRAN FDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRAN cell 1 on RF channel number 1 |
| Neighbor cells | | Cell 2 | UTRAN cell 2 on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRAN FDD) measurement quantity | | CPICH RSCP | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CP length | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |

**Table A.9.3.1.2-2: E-UTRAN FDD cell specific test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | Unit | Test 1 | Test 2 |
|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | |
| RSRP Note 3 | dBm/15 kHz | -94 | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | |
| SCH_RP Note 3 | dBm/15 kHz | -94 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.3.1.2-3: UTRAN FDD cell specific test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | | Unit | Test 1 | Test 2 |
|---|---|---|---|---|
| | | | Cell 2 | Cell 2 |
| CPICH_Ec/Ior | | dB | -10 | -10 |
| PCCPCH_Ec/Ior | | dB | -12 | -12 |
| SCH_Ec/Ior | | dB | -12 | -12 |
| PICH_Ec/Ior | | dB | -15 | -15 |
| DPCH_Ec/Ior | | dB | - | - |
| OCNS_Ec/Ior | | dB | -0.94 | -0.94 |
| Ioc | Band I, IV, VI, X, XI, XIX, XXI | dBm/3.84 MHz | -60.00 | -94.46 |
| | Band II, V, VII | | | -92.46 |
| | Band XXV, XXVI | | | -90.96 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -91.46 |
| | Band IX (Note 2) | | | -93.46 |
| Îor/Ioc | | dB | 9.54 | -9.54 |
| CPICH RSCP, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm | -60.46 | -114.0 |
| | Band II, V, VII | | | -112.0 |
| | Band XXV, XXVI | | | -110.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -111.0 |
| | Band IX (Note 2) | | | -113.0 |
| Io, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm/3.84 MHz | -50.00 | -94.0 |
| | Band II, V, VII | | | -92.0 |
| | Band XXV, XXVI | | | -90.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -91.0 |
| | Band IX (Note 2) | | | -93.0 |
| Propagation condition | | - | AWGN | AWGN |
| NOTE 1: CPICH RSCP and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves. | | | | |
| NOTE 2: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE. | | | | |
| NOTE 3: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | |
| Tests shall be done sequentially. Test 1 shall be done first. After test 1 has been executed test parameters for test 2 shall be set within 5 seconds so that UE does not loose the Cell 2 in between the tests. | | | | |

### A.9.3.1.3 Test Requirements

The CPICH RSCP measurement absolute accuracy shall meet the requirements in Clause 9.2.1.

## A.9.3.2 E-UTRAN TDD

### A.9.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CPICH RSCP absolute measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.2.1. There are three different test setups with different UTRAN parameters.

### A.9.3.2.2 Parameters

The test parameters are given in Tables A.9.3.2.2-1, A.9.3.2.2-2 and A.9.3.2.2-3 below.

**Table A.9.3.2.2-1: General test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN TDD carrier frequency is used. |
| UTRAN RF Channel Number | | 1 | One UTRAN FDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRAN cell 1 on RF channel number 1 |
| Neighbor cells | | Cell 2 | UTRAN cell 2 on RF channel number 1 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRAN FDD) measurement quantity | | CPICH RSCP | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CP length | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |

**Table A.9.3.2.2-2: E-UTRAN TDD cell specific test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | Unit | Test 1 | Test 2 |
|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration[Note1] | | 6 | |
| Uplink-downlink configuration[Note1] | | 1 | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note 2] | dB | | |
| OCNG_RB[Note 2] | dB | | |
| $N_{oc}$ [Note 3] | dBm/15 kHz | -98 | |
| RSRP [Note 4] | dBm/15 kHz | -94 | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | |
| SCH_RP [Note 4] | dBm/15 kHz | -94 | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | |
| Propagation Condition | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.3.2.2-3: UTRAN FDD cell specific test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | | Unit | Test 1 | Test 2 |
|---|---|---|---|---|
| | | | Cell 2 | Cell 2 |
| CPICH_Ec/Ior | | dB | -10 | -10 |
| PCCPCH_Ec/Ior | | dB | -12 | -12 |
| SCH_Ec/Ior | | dB | -12 | -12 |
| PICH_Ec/Ior | | dB | -15 | -15 |
| DPCH_Ec/Ior | | dB | - | - |
| OCNS_Ec/Ior | | dB | -0.94 | -0.94 |
| Ioc | Band I, IV, VI, X, XI, XIX, XXI | dBm/3.84 MHz | -60.00 | -94.46 |
| | Band II, V, VII | | | -92.46 |
| | Band XXV, XXVI | | | -90.96 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -91.46 |
| | Band IX (Note 2) | | | -93.46 |
| Îor/Ioc | | dB | 9.54 | -9.54 |
| CPICH RSCP, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm | -60.46 | -114.0 |
| | Band II, V, VII | | | -112.0 |
| | Band XXV, XXVI | | | -110.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -111.0 |
| | Band IX (Note 2) | | | -113.0 |
| Io, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm/3.84 MHz | -50.00 | -94.0 |
| | Band II, V, VII | | | -92.0 |
| | Band XXV, XXVI | | | -90.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | -91.0 |
| | Band IX (Note 2) | | | -93.0 |
| Propagation condition | | - | AWGN | AWGN |
| NOTE 1: CPICH RSCP and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves. | | | | |
| NOTE 2: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE. | | | | |
| NOTE 3: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | |
| Tests shall be done sequentially. Test 1 shall be done first. After test 1 has been executed test parameters for test 2 shall be set within 5 seconds so that UE does not loose the Cell 2 in between the tests. | | | | |

### A.9.3.2.3 Test Requirements

The CPICH RSCP measurement absolute accuracy shall meet the requirements in Clause 9.2.1.

## A.9.3.3 E-UTRAN FDD for 5MHz Bandwidth

### A.9.3.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.3.1.1.

### A.9.3.3.2 Parameters

The parameters of this test are the same as defined in Subclause A.9.3.1.2 except that the values of the parameters in the Table A.9.3.3.2-1 will replace the values of the corresponding parameters in A.9.3.1.2-1, and the values of E-UTRAN FDD cell specific parameters in the Table A.9.3.3.2-2 shall be adopted, and the values of UTRA FDD cell specific parameters shall be reused as defined in Table A.9.3.1.2-3 of Subclause A.9.3.1.2.

**Table A.9.3.3.2-1: General test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN FDD for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Note 1: See Table A.9.3.1.2-1 for other general test parameters. | | | |

**Table A.9.3.3.2-2: E-UTRAN FDD cell specific test parameters for UTRAN FDD CPICH RSCP absolute measurement accuracy test in E-UTRAN FDD for 5MHz bandwidth**

| Parameter | | Unit | Test 1 | Test 2 |
|---|---|---|---|---|
| E-UTRAN RF Channel Number | | | 1 | |
| $BW_{channel}$ | | MHz | 5 | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) | | | OP.15 FDD | |
| PBCH_RA | | dB | 0 | |
| PBCH_RB | | dB | | |
| PSS_RA | | dB | | |
| SSS_RA | | dB | | |
| PCFICH_RB | | dB | | |
| PHICH_RA | | dB | | |
| PHICH_RB | | dB | | |
| PDCCH_RA | | dB | | |
| PDCCH_RB | | dB | | |
| PDSCH_RA | | dB | | |
| PDSCH_RB | | dB | | |
| OCNG_RA Note 1 | | dB | | |
| OCNG_RB Note 1 | | dB | | |
| $N_{oc}$ Note 2 | FDD_N | dBm/15 kHz | -98 | |
| RSRP Note 3 | FDD_N | dBm/15 kHz | -94 | |
| $\hat{E}_s/I_{ot}$ | | dB | 4 | |
| SCH_RP Note 3 | FDD_N | dBm/15 kHz | -94 | |
| $\hat{E}_s/N_{oc}$ | | dB | 4 | |
| Io Note3 | FDD_N | dBm/4.5 MHz | -67.8 | |
| Propagation Condition | | | AWGN | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.9.3.3.3 Test Requirements

The test requirements defined in section A.9.3.1.3 shall apply to this test case.

## A.9.4 UTRAN FDD CPICH Ec/No

### A.9.4.1 E-UTRAN FDD

#### A.9.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the CPICH Ec/No absolute measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.2.3. There are three different test setups with different UTRAN parameters.

### A.9.4.1.2 Parameters

The test parameters are given in Tables A.9.4.1.2-1, A.9.4.1.2-2 and A.9.4.1.2-3 below.

**Table A.9.4.1.2-1: General test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN FDD carrier frequency is used. |
| UTRAN RF Channel Number | | 1 | One UTRAN FDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRAN cell 1 on RF channel number 1 |
| Neighbor cells | | Cell 2 | UTRAN cell 2 on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRAN FDD) measurement quantity | | CPICH Ec/N0 | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CP length | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |

**Table A.9.4.1.2-2: E-UTRAN FDD cell specific test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA Note 1 | dB | | | |
| OCNG_RB Note 1 | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | | |
| RSRP Note 3 | dBm/15 kHz | -94 | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | | |
| SCH_RP Note 3 | dBm/15 kHz | -94 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | | |
| Propagation Condition | | AWGN | | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

**Table A.9.4.1.2-3: UTRAN FDD cell specific test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN FDD**

| Parameter | | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|---|
| | | | Cell 2 | Cell 2 | Cell 2 |
| CPICH_Ec/Ior | | dB | -10 | -10 | -10 |
| PCCPCH_Ec/Ior | | dB | -12 | -12 | -12 |
| SCH_Ec/Ior | | dB | -12 | -12 | -12 |
| PICH_Ec/Ior | | dB | -15 | -15 | -15 |
| DPCH_Ec/Ior | | dB | - | - | - |
| OCNS_Ec/Ior | | dB | -0.94 | -0.94 | -0.94 |
| Ioc | Band I, IV, VI, X, XI, XIX, XXI | dBm/ 3.84 MHz | -52.22 | -87.27 | -94.46 |
| | Band II, V, VII | | | | -92.46 |
| | Band XXV, XXVI | | | | -90.96 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | | -91.46 |
| | Band IX (Note 2) | | | | -93.46 |
| Îor/Ioc | | dB | -1.75 | -4.7 | -9.54 |
| CPICH Ec/Io, Note 1 | | dBm | -14.0 | -16.0 | -20.0 |
| Io, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm/ 3.84 MHz | -50 | -86 | -94 |
| | Band II, V, VII | | | | -92.0 |
| | Band XXV, XXVI | | | | -90.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | | -91.0 |
| | Band IX (Note 2) | | | | -93 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| NOTE 1: CPICH Ec/Io and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves. | | | | | |
| NOTE 2: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE. | | | | | |
| NOTE 3: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | | |
| Tests shall be done sequentially. Test 1 shall be done first. After test 1 has been executed test parameters for tests 2 and 3 shall be set within 5 seconds so that UE does not loose the Cell 2 in between the tests. | | | | | |

## A.9.4.1.3 Test Requirements

The CPICH Ec/No measurement absolute accuracy shall meet the requirements in Clause 9.2.3.

The effect of assumed thermal noise and noise generated in the receiver (-99 dBm for frequency bands I, IV, VI, X, XI, XIX and XXI; -98 dBm for frequency band IX, -97dBm for frequency bands II, V and VII; -95.5dBm for frequency band XXV and XXVI; and -96dBm for frequency band III) shall be added into the required accuracy. The test requirements for the absolute CPICH_Ec/Io measurement are shown in Table A.9.4.1.3-1.

**Table A.9.4.1.3-1: CPICH_Ec/Io absolute accuracy**

| Parameter | Unit | Accuracy [dB] | | Conditions |
|---|---|---|---|---|
| | | Normal condition | Extreme condition | Io [dBm/3,84 MHz] |

| | | | | |
|---|---|---|---|---|
| CPICH_Ec/Io | dB | -2.7…1.5 for -14 ≤ CPICH Ec/Io<br>-3.2…2 for -16 ≤ CPICH Ec/Io < -14<br>-4.2…3 for -20 ≤ CPICH Ec/Io < -16 | -4.2…3 | -94...-87(Band I, IV, VI, X, XI, XIX, XXI)<br>-92…-85 (Band II, V, VII)<br>-90.5…-83.5 (Band XXV, XXVI (Note 2))<br>-91…-84 (Band III, VIII, XII, XIII, XIV, XX, XXII)<br>93…-86 (Band IX (Note 1)) |
| | | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3 | -87...-50(Band I, IV, VI, X, XI, XIX, XXI)<br>-85…-50 (Band II, V, VII)<br>-83.5…-50 (Band XXV, XXVI (Note 2))<br>-84…-50 (Band III, VIII, XII, XIII, XIV, XX, XXII)<br>-86…-50 (Band IX (Note 1)) |
| NOTE1: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE.<br>NOTE 2: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | |

## A.9.4.2 E-UTRAN TDD

### A.9.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the CPICH Ec/No absolute measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.2.3. There are three different test setups with different UTRAN parameters.

### A.9.4.2.2 Parameters

The test parameters are given in Tables A.9.4.2.2-1, A.9.4.2.2-2 and A.9.4.2.2-3 below.

**Table A.9.4.2.2-1: General test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN TDD carrier frequency is used. |
| UTRAN RF Channel Number | | 1 | One UTRAN FDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRAN cell 1 on RF channel number 1 |
| Neighbor cells | | Cell 2 | UTRAN cell 2 on RF channel number 1 |
| Gap Pattern Id | | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| Inter-RAT (UTRAN FDD) measurement quantity | | CPICH Ec/N0 | |
| Monitored UTRA FDD cell list size | | 12 | UTRA cells on UTRA RF channel 1 provided in the cell list. |
| CP length | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |

**Table A.9.4.2.2-2: E-UTRAN TDD cell specific test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|

| | | |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| Special subframe configuration Note1 | | 6 |
| Uplink-downlink configuration Note1 | | 1 |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 2 | dB | |
| OCNG_RB Note 2 | dB | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 |
| RSRP Note 4 | dBm/15 kHz | -94 |
| $\hat{E}_s / I_{ot}$ | dB | 4 |
| SCH_RP Note 4 | dBm/15 kHz | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation Condition | | AWGN |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.4.2.2-3: UTRAN FDD cell specific test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN TDD**

| Parameter | | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|---|
| | | | Cell 2 | Cell 2 | Cell 2 |
| CPICH_Ec/Ior | | dB | -10 | -10 | -10 |
| PCCPCH_Ec/Ior | | dB | -12 | -12 | -12 |
| SCH_Ec/Ior | | dB | -12 | -12 | -12 |
| PICH_Ec/Ior | | dB | -15 | -15 | -15 |
| DPCH_Ec/Ior | | dB | - | - | - |
| OCNS_Ec/Ior | | dB | -0.94 | -0.94 | -0.94 |
| Ioc | Band I, IV, VI, X, XI, XIX, XXI | dBm/ 3.84 MHz | -52.22 | -87.27 | -94.46 |
| | Band II, V, VII | | | | -92.46 |
| | Band XXV, XXVI | | | | -90.96 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | | -91.46 |
| | Band IX (Note 2) | | | | -93.46 |
| Îor/Ioc | | dB | -1.75 | -4.7 | -9.54 |
| CPICH Ec/Io, Note 1 | | dBm | -14.0 | -16.0 | -20.0 |
| Io, Note 1 | Band I, IV, VI, X, XI, XIX, XXI | dBm/ 3.84 MHz | -50 | -86 | -94 |
| | Band II, V, VII | | | | -92.0 |

| | | | | | |
|---|---|---|---|---|---|
| | Band XXV, XXVI | | | | -90.5 (Note 3) |
| | Band III, VIII, XII, XIII, XIV, XX, XXII | | | | -91.0 |
| | Band IX (Note 2) | | | | -93 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| NOTE 1: CPICH Ec/Io and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves.<br>NOTE 2: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE.<br>NOTE 3: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | | |
| Tests shall be done sequentially. Test 1 shall be done first. After test 1 has been executed test parameters for tests 2 and 3 shall be set within 5 seconds so that UE does not loose the Cell 2 in between the tests. | | | | | |

### A.9.4.2.3 Test Requirements

The CPICH Ec/No measurement absolute accuracy shall meet the requirements in Clause 9.2.3.

The effect of assumed thermal noise and noise generated in the receiver (-99 dBm for frequency bands I, IV, VI, X, XI, XIX and XXI; -98 dBm for frequency band IX, -97dBm for frequency bands II, V and VII; -95.5dBm for frequency band XXV and XXVI; and -96dBm for frequency band III) shall be added into the required accuracy. The test requirements for the absolute CPICH_Ec/Io measurement are shown in Table A.9.4.2.3-1.

**Table A.9.4.2.3-1: CPICH_Ec/Io absolute accuracy**

| **Parameter** | **Unit** | **Accuracy [dB]** | | **Conditions** |
|---|---|---|---|---|
| | | **Normal condition** | **Extreme condition** | **Io [dBm/3,84 MHz]** |
| CPICH_Ec/Io | dB | -2.7…1.5 for -14 ≤ CPICH Ec/Io<br>-3.2…2 for -16 ≤ CPICH Ec/Io < -14<br>-4.2…3 for -20 ≤ CPICH Ec/Io < -16 | -4.2…3 | -94...-87(Band I, IV, VI, X, XI, XIX, XXI)<br>-92…-85 (Band II, V, VII)<br>-90.5…-83.5 (Band XXV, XXVI (Note 2))<br>-91…-84 (Band III, VIII, XII, XIII, XIV, XX, XXII)<br>93…-86 (Band IX (Note 1)) |
| | | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3 | -87...-50(Band I, IV, VI, X, XI, XIX, XXI)<br>-85…-50 (Band II, V, VII)<br>-83.5…-50 (Band XXV, XXVI (Note 2))<br>-84…-50 (Band III, VIII, XII, XIII, XIV, XX, XXII)<br>-86…-50 (Band IX (Note 1)) |
| NOTE1: For the UE which supports both Band III and Band IX operating frequencies, the measurement performance requirements for Band III shall apply to the multi-band UE.<br>NOTE 2: The test parameter is modified by -1.5 dB when the carrier frequency of the assigned UTRA channel is within 869-894 MHz for the UE which supports both Band V and Band XXVI operating frequencies. | | | | |

## A.9.4.3 E-UTRAN FDD for 5MHz Bandwidth

### A.9.4.3.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.4.1.1.

### A.9.4.3.2 Parameters

The parameters of this test are the same as defined in Subclause A.9.4.1.2 except that the values of the parameters in the Table A.9.4.3.2-1 will replace the values of the corresponding parameters in A.9.4.1.2-1, and the values of E-UTRAN FDD cell specific parameters in the Table A.9.4.3.2-2 shall be adopted, and the values of UTRA FDD cell specific parameters shall be reused as defined in Table A.9.4.1.2-3 of Subclause A.9.4.1.2.

**Table A.9.4.3.2-1: General test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN FDD for 5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.5 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.11 FDD | As specified in clause A.3.1.2.1 |
| E-UTRAN Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| Note 1: See Table A.9.4.1.2-1 for other general test parameters. | | | |

**Table A.9.4.3.2-2: E-UTRAN FDD cell specific test parameters for UTRAN FDD CPICH Ec/No absolute measurement accuracy test in E-UTRAN FDD for 5MHz bandwidth**

| Parameter | | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|---|
| E-UTRAN RF Channel Number | | | 1 | | |
| $BW_{channel}$ | | MHz | 5 | | |
| OCNG Patterns defined in A.3.2.1.15 (OP.15 FDD) | | | OP.15 FDD | | |
| PBCH_RA | | dB | 0 | | |
| PBCH_RB | | dB | | | |
| PSS_RA | | dB | | | |
| SSS_RA | | dB | | | |
| PCFICH_RB | | dB | | | |
| PHICH_RA | | dB | | | |
| PHICH_RB | | dB | | | |
| PDCCH_RA | | dB | | | |
| PDCCH_RB | | dB | | | |
| PDSCH_RA | | dB | | | |
| PDSCH_RB | | dB | | | |
| OCNG_RA Note 1 | | dB | | | |
| OCNG_RB Note 1 | | dB | | | |
| $N_{oc}$ Note 2 | FDD_N | dBm/15 kHz | -98 | | |
| RSRP Note 3 | FDD_N | dBm/15 kHz | -94 | | |
| $\hat{E}_s / I_{ot}$ | | dB | 4 | | |
| SCH_RP Note 3 | FDD_N | dBm/15 kHz | -94 | | |
| $\hat{E}_s / N_{oc}$ | | dB | 4 | | |
| Io Note3 | FDD_N | dBm/4.5 MHz | -67.8 | | |
| Propagation Condition | | | AWGN | | |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.9.4.3.3 Test Requirements

The test requirements defined in section A.9.4.1.3 shall apply to this test case.

# A.9.5 UTRAN TDD measurement

## A.9.5.1 P-CCPCH RSCP absolute accuracy for E-UTRAN FDD

### A.9.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UTRAN TDD P-CCPCH RSCP measurement absolute accuracy is within the specified limits. This test will verify the requirements in clause 9.3.1 and applies to UE supporting this capability.

Gap pattern configuration with id #1 as specified in Table 8.1.2.1-1 is provided. In the measurement control information it is indicated to the UE that periodic reporting of the UTRA TDD P-CCPCH RSRP measurement is used.

### A.9.5.1.2 Test parameters

In this set of test cases there are two cells. Cell 1 is a E-UTRA FDD cell and cell 2 is a UTRA TDD cell. The absolute accuracy of P-CCPCH RSCP measurements are tested by using test parameters in Table A.9.5.1-1, Table A.9.5.1-2, and Table A.9.5.1-3. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.9.5.1-1: General test parameters for UTRA TDD P-CCPCH RSCP measurement absolute accuracy in E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1 |
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN FDD carrier frequency is used. |
| UTRAN RF Channel Number | | 2 | One UTRAN TDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth (BWchannel) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRAN FDD cell 1 on RF channel number 1 |
| Neighbor cells | | Cell 2 | 1.28Mcps UTRA TDD cell 2 on RF channel number 2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| CP length of cell 1 | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | OFF |
| Inter-RAT (UTRAN TDD) measurement quantity | | P-CCPCH RSRP | |

**Table A.9.5.1-2: UTRA TDD P-CCPCH RSCP measurement tests parameters (cell 1)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |

| | | |
|---|---|---|
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / I_{ot}$ | dB | 4 |
| RSRP Note3 | dBm/15 kHz | -94 |
| Io Note3 | dBm/9 MHz | -64.76 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation condition | - | AWGN |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. | | |

**Table A.9.5.1-3: UTRA TDD P-CCPCH RSCP measurement tests parameters (cell 2)**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| DL timeslot number | | 0 | | DwPTS | | 0 | DwPTS |
| UTRA RF Channel number Note2 | | Channel 2 | | Channel 2 | | Channel 2 | |
| PCCPCH_Ec/Ior | dB | -3 | | -3 | | -3 | |
| DwPCH_Ec/Ior | dB | | 0 | | 0 | | 0 |
| OCNS_Ec/Ior | dB | -3 | | -3 | | -3 | |
| Ioc | dBm/1.28MHz | -54.1 | | -75.2 | | -97 | |
| Îor/Ioc | dB | 2 | | 5 | | 0 | |
| PCCPCH RSCP Note1 | dBm | -55.1 | | -73.2 | | -100 | |
| Io Note1 | dBm/1.28MHz | -50 | | -69 | | -94 | |
| Propagation condition | | AWGN | | | | | |
| Note 1: PCCPCH RSCP and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: In the case of multi-frequency network of 1.28 Mcps TDD, the UTRA RF Channel Number can be set for the primary frequency in this test. | | | | | | | |

### A.9.5.1.3 Test Requirements

The UTRA TDD P-CCPCH RSCP measurement accuracy shall meet the requirements in clause 9.3.1.

## A.9.5.2 P-CCPCH RSCP absolute accuracy for E-UTRAN TDD

### A.9.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UTRAN TDD P-CCPCH RSCP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.3.1 and applies to UE supporting this capability.

Gap pattern configuration with id #1 as specified in Table 8.1.2.1-1 is provided. In the measurement control information it is indicated to the UE that periodic reporting of the UTRA TDD P-CCPCH RSRP measurement is used.

### A.9.5.2.2 Test parameters

In this set of test cases there are two cells. Cell 1 is a E-UTRA TDD cell and cell 2 is a UTRA TDD cell. The absolute accuracy of P-CCPCH RSCP measurements are tested by using test parameters in Table A.9.5.2-1, Table A.9.5.2-2, and Table A.9.5.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

**Table A.9.5.2-1: General test parameters for UTRA TDD P-CCPCH RSCP measurement**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| E-UTRAN RF Channel Number | | 1 | One E-UTRAN TDD carrier frequency is used. |
| UTRAN RF Channel Number | | 2 | One UTRAN TDD carrier frequency is used. |
| E-UTRAN Channel Bandwidth (BWchannel) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRA TDD cell1 on RF channel number 1 |
| Neighbour cell | | Cell 2 | 1.28Mcps UTRA TDD Cell2 on RF channel number 2 |
| Gap Pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| CP length of cell 1 | | Normal | |
| Filter coefficient | | 0 | L3 filtering is not used |
| DRX | | OFF | |
| Time offset between cells | ms | 3 | Asynchronous cells |
| Inter-RAT (UTRAN TDD) measurement quantity | | P-CCPCH RSCP | |

**Table A.9.5.2-2: UTRA TDD P-CCPCH RSCP measurement tests parameters (cell 1)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | |
| BWchannel | MHz | 10 | | |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA[Note1] | | | | |
| OCNG_RB[Note1] | | | | |
| $N_{oc}$ [Note2] | dBm/15 kHz | -98 | | |
| $\hat{E}_s / I_{ot}$ | dB | 4 | | |
| RSRP[Note3] | dBm/15 kHz | -94 | | |
| Io[Note3] | dBm/9 MHz | -64.76 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4 | | |
| Propagation condition | - | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

**Table A.9.5.2-3: UTRA TDD P-CCPCH RSCP measurement tests parameters (cell 2)**

| Parameter | Unit | Test 1 | | Test 2 | | Test 3 | |
|---|---|---|---|---|---|---|---|
| DL timeslot number | | 0 | | DwPTS | | 0 | DwPTS |
| UTRA RF Channel number Note2 | | Channel 2 | | Channel 2 | | Channel 2 | |
| PCCPCH_Ec/Ior | dB | -3 | | -3 | | -3 | |
| DwPCH_Ec/Ior | dB | | 0 | | 0 | | 0 |
| OCNS_Ec/Ior | dB | -3 | | -3 | | -3 | |
| Ioc | dBm/1.28MHz | -54.1 | | -75.2 | | -97 | |
| Îor/Ioc | dB | 2 | | 5 | | 0 | |
| PCCPCH RSCP Note1 | dBm | -55.1 | | -73.2 | | -100 | |
| Io Note1 | dBm/1.28MHz | -50 | | -69 | | -94 | |
| Propagation condition | | AWGN | | | | | |
| Note 1: PCCPCH RSCP and Io levels have been calculated from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: In the case of multi-frequency network of 1.28 Mcps TDD, the UTRA RF Channel Number can be set for the primary frequency in this test. | | | | | | | |

### A.9.5.2.3 Test Requirements

The UTRA TDD P-CCPCH RSCP measurement accuracy shall meet the requirements in clause 9.3.1.

## A.9.6 GSM Carrier RSSI

### A.9.6.1 E-UTRAN FDD

#### A.9.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the GSM Carrier RSSI measurement accuracy is within the specified limits when the active cell is E-UTRAN FDD. This test will verify the requirements in clause 9.4.1. There are 12 different test setups with different signal levels for the GSM cells.

Measurement gaps are configured to measure on the GSM cells. Table A.9.6.1.1-2 defines the cell specific test parameters for the E-UTRAN FDD cell. In the measurement control information it is indicated to the UE that periodic reporting of the GSM RSSI measurement is used. The limits of the GSM test parameters in terms of GSM BCCH received level at the receiver inputs are defined in Table A.9.6.1.1-3.

**Table A.9.6.1.1-1: General GSM Carrier RSSI test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.0 FDD | As specified in clause A.3.1.1.1. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN FDD) | | DL Reference Measurement Channel R.6 FDD | As specified in clause A.3.1.2.1. |
| Active cell | - | Cell 1 | |
| DRX | - | OFF | |
| Gap pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Filtering coefficient | - | 0 | L3 filtering is not used. |
| Inter-RAT measurement quantity | | GSM Carrier RSSI | |
| Monitored cell list size | | 6 GSM neighbours including ARFCN 1 | Included in the Measurement control information |

**Table A.9.6.1.1.-2: E-UTRAN FDD Cell specific test parameters for GSM Carrier RSSI accuracy test in E-UTRAN FDD**

| Parameter | Unit | Tests 1-12 |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |

| $BW_{channel}$ | MHz | 10 |
|---|---|---|
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 |
| RSRP Note 3 | dBm/15 kHz | -94 |
| $\hat{E}_s / I_{ot}$ | dB | 4 |
| SCH_RP Note 3 | dBm/15 kHz | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation Condition | | AWGN |

Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.6.1.1-3: BCCH signal levels at receiver input in dBm**

| Step | BCCH1 | BCCH2 | BCCH3 | BCCH4 | BCCH5 | BCCH6 |
|---|---|---|---|---|---|---|
| 1 | -38.5 | -38.5 | NA | NA | NA | NA |
| 2 | -48.5 | -48.5 | NA | NA | NA | NA |
| 3 | -70.5 | -70.5 | NA | NA | NA | NA |
| 4 | -109.5 | -109.5 | NA | NA | NA | NA |
| 5 | -57.5 | NA | -54.5 | NA | NA | NA |
| 6 | -64.5 | NA | -59.5 | NA | NA | NA |
| 7 | -71.5 | NA | NA | -64.5 | NA | NA |
| 8 | -78.5 | NA | NA | -69.5 | NA | NA |
| 9 | -85.5 | NA | NA | NA | -74.5 | NA |
| 10 | -92.5 | NA | NA | NA | -79.5 | NA |
| 11 | -99.5 | NA | NA | NA | NA | -84.5 |
| 12 | -106.5 | NA | NA | NA | NA | -89.5 |

### A.9.6.1.2 Test Requirements

The GSM Carrier RSSI measurement accuracy shall meet the requirements in clause 9.4.1.

## A.9.6.2 E-UTRAN TDD

### A.9.6.2.1 Test Purpose and Environment

The purpose of this test is to verify that the GSM Carrier RSSI measurement accuracy is within the specified limits when the active cell is E-UTRAN TDD. This test will verify the requirements in clause 9.4.1. There are 12 different test setups with different signal levels for the GSM cells.

Measurement gaps are configured to measure on the GSM cells. Table A.9.6.2.1-2 defines the cell specific test parameters for the E-UTRAN TDD cell. In the measurement control information it is indicated to the UE that periodic reporting of the GSM RSSI measurement is used. The limits of the GSM test parameters in terms of GSM BCCH received level at the receiver inputs are defined in Table A.9.6.2.1-3.

**Table A.9.6.2.1-1: General GSM Carrier RSSI test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PDSCH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2. |
| PCFICH/PDCCH/PHICH parameters (E-UTRAN TDD) | | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2. |
| Active cell | - | Cell 1 | |
| DRX | - | OFF | |
| Uplink-downlink configuration of cell 1 | | 1 | As specified in table 4.2.2 in TS 36.211 |
| Special subframe configuration of cell 1 | | 6 | As specified in table 4.2.1 in TS 36.211 |
| Gap pattern Id | | 1 | As specified in TS 36.133 clause 8.1.2.1. |
| Filtering coefficient | - | 0 | L3 filtering is not used. |
| Inter-RAT measurement quantity | | GSM Carrier RSSI | |
| Monitored cell list size | | 6 GSM neighbours including ARFCN 1 | Included in the Measurement control information |

**Table A.9.6.2.1-2: E-UTRAN TDD Cell specific test parameters for GSM Carrier RSSI accuracy test in E-UTRAN TDD**

| Parameter | Unit | Tests 1 - 12 |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |
| $BW_{channel}$ | MHz | 10 |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | OP.1 TDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PCFICH_RB | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note 1 | dB | |
| OCNG_RB Note 1 | dB | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 |
| RSRP Note 3 | dBm/15 kHz | -94 |
| $\hat{E}_s/I_{ot}$ | dB | 4 |

| | | |
|---|---|---|
| SCH_RP Note 3 | dBm/15 kHz | -94 |
| $\hat{E}_s / N_{oc}$ | dB | 4 |
| Propagation Condition | | AWGN |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | |

**Table A.9.6.2.1-3: BCCH signal levels at receiver input in dBm**

| Step | BCCH1 | BCCH2 | BCCH3 | BCCH4 | BCCH5 | BCCH6 |
|---|---|---|---|---|---|---|
| 1 | -38.5 | -38.5 | NA | NA | NA | NA |
| 2 | -48.5 | -48.5 | NA | NA | NA | NA |
| 3 | -70.5 | -70.5 | NA | NA | NA | NA |
| 4 | -109.5 | -109.5 | NA | NA | NA | NA |
| 5 | -57.5 | NA | -54.5 | NA | NA | NA |
| 6 | -64.5 | NA | -59.5 | NA | NA | NA |
| 7 | -71.5 | NA | NA | -64.5 | NA | NA |
| 8 | -78.5 | NA | NA | -69.5 | NA | NA |
| 9 | -85.5 | NA | NA | NA | -74.5 | NA |
| 10 | -92.5 | NA | NA | NA | -79.5 | NA |
| 11 | -99.5 | NA | NA | NA | NA | -84.5 |
| 12 | -106.5 | NA | NA | NA | NA | -89.5 |

### A.9.6.2.2 Test Requirements

The GSM Carrier RSSI measurement accuracy shall meet the requirements in clause 9.4.1.

## A.9.7 UE Rx – Tx Time Difference

### A.9.7.1 E-UTRAN FDD UE Rx – Tx time difference case

#### A.9.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN FDD UE Rx – Tx time difference measurement accuracy is within the specified limits in Clause 9.1.9.

There is only one active cell in the test. The tested UE is connected with the PCell, configured to transmit SRS signals periodically, and signaled to report UE Rx – Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE.

#### A.9.7.1.2 Test parameters

The parameters for this test case are defined in Table A.9.7.1.2-1, and the SRS configuration used is defined in Table A.9.7.1.2-2.

**Table A.9.7.1.2-1: FDD UE Rx – Tx time difference test parameters**

| Parameter | Unit | Test 1 | Test 2 |
|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | 1 |
| $BW_{channel}$ | MHz | 1.4 | 10 |
| DRX | | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.2 FDD | R.0 FDD |
| PDSCH allocation | $n_{PRB}$ | 2—3 | 13—36 |

| | | | |
|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.8 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.3 (OP.3 FDD) and A.3.2.1.1 (OP.1 FDD) | | OP.3 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 |
| RSRP Note3 | dBm/15 kHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 |
| Io Note3 | dBm/1.08 MHz | -77.66 | N/A |
| | dBm/9 MHz | N/A | -68.45 |
| $\hat{E}_s / I_{ot}$ | dB | -3 | -3 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the resources in the active cell are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.7.1.2-2: Sounding Reference Symbol Configuration to be used in FDD UE Rx – Tx time difference test**

| Field | Test 1 | Test 2 | Comment |
|---|---|---|---|
| | Value | | |
| srsBandwidthConfiguration | bw7 | bw5 | |
| srsSubframeConfiguration | sc1 | | |
| ackNackSrsSimultaneousTransmission | FALSE | | |
| srsMaxUpPTS | N/A | | Not applicable for FDD |
| srsBandwidth | 0 | | No hopping |
| srsHoppingBandwidth | hbw0 | | |
| frequencyDomainPosition | 0 | | |
| Duration | TRUE | | Indefinite duration |
| Srs-ConfigurationIndex | 0 | | SRS periodicity of 2ms for all Tests. |
| transmissionComb | 0 | | |
| cyclicShift | cs0 | | No cyclic shift |
| SRS-AntennaPort | an1 | | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

## A.9.7.1.3 Test Requirements

The UE Rx – Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.9.1.

# A.9.7.2 E-UTRA TDD UE Rx – Tx time difference case

## A.9.7.2.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN TDD UE Rx-Tx time difference measurement accuracy is within the specified limits in clause 9.1.9.

There is only one cell in the test. The tested UE is connected with the PCell, configured to transmit SRS signals periodcally, and signaled to report UE Rx – Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx – Tx measurement reported by the UE.

## A.9.7.2.2 Test parameters

The parameters for this test case are defined in Table A.9.7.2.2-1, and the SRS configuration used is defined in Table A.9.7.2.2-2.

**Table A.9.7.2.2-1: Cell specific test parameters for UE Rx-Tx time difference measurement**

| Parameter | Unit | Tests 1 | Tests 2 |
|---|---|---|---|
| E-UTRAN RF Channel Number | - | 1 | 1 |
| $BW_{channel}$ | MHz | 1.4 | 10 |
| Uplink-downlink configuration of cell Note1 | | 1 | 1 |
| Special subframe configuration of cell Note1 | | 6 | 6 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | - | R.2 TDD | R.0 TDD |
| PDSCH allocation | $n_{PRB}$ | 2-3 | 13-36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | - | R.8 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.3 (OP.3 TDD) and A.3.2.2.1 (OP.1 TDD) | - | OP.3 TDD | OP.1 TDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note2 | dB | | |
| OCNG_RB Note2 | dB | | |
| $N_{oc}$ Note 3 | dBm/15 kHz | -98 | -98 |
| RSRP Note 4 | dBm/15 kHz | -101 | -101 |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 |
| Io Note 4 | dBm/1.08 MHz | -77.66 | N/A |
| | dBm/9 MHz | N/A | -68.45 |
| $\hat{E}_s / I_{ot}$ | dB | -3 | -3 |
| Propagation Condition | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

**Table A.9.7.2.2-2: Sounding Reference Symbol Configuration to be used in TDD UE Rx – Tx time difference test**

| Field | Test 1 | Test 2 | Comment |
|---|---|---|---|
| | Value | | |
| srsBandwidthConfiguration | bw7 | bw5 | |
| srsSubframeConfiguration | sc1 | | |
| ackNackSrsSimultaneousTransmission | FALSE | | |
| srsMaxUpPTS | TRUE | | |
| srsBandwidth | 0 | | No hopping |
| srsHoppingBandwidth | hbw0 | | |
| frequencyDomainPosition | 0 | | |
| Duration | TRUE | | Indefinite duration |
| Srs-ConfigurationIndex | 10 | | SRS periodicity of 10ms for all Tests. |
| transmissionComb | 0 | | |
| cyclicShift | cs0 | | No cyclic shift |
| SRS-AntennaPort | an1 | | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | | |

### A.9.7.2.3 Test Requirements

The UE Rx – Tx time difference measurement accuracy shall fulfill the requirements in clause 9.1.9.1.

## A.9.7.3 E-UTRAN FDD UE Rx–Tx Time Difference under Time-Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.9.7.3.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN FDD UE Rx–Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.9.3 when time-domain measurement resource restriction is configured for PCell measurements via higher-layer signalling [2] and non-MBSFN ABS are configured in the interfering cell.

### A.9.7.3.2 Test parameters

In this test case, there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. Cell 1 is the PCell on which UE Rx-Tx is measured, and Cell 2 is the interfering cell. Non-MBSFN ABS pattern is configured in Cell 2 during the entire test.

The tested UE is connected to the PCell and configured to transmit SRS signals periodically. The SRS configuration is provided to the UE before the measurement starts. The UE is configured to report UE Rx–Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on PCell. The information for both patterns shall be provided to the UE before the measurement starts.

The general and cell-specific parameters for this test case are defined in Table A.9.7.3.2-1 and Table A.9.7.3.2-2, respectively, and the SRS configuration used is specified in Table A.9.7.3.2-3.

**Table A.9.7.3.2-1: General test parameters for FDD UE Rx–Tx time difference measurement under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | The measured cell |
| Neighbour cell | | Cell 2 | The cell interfering to Cell 1 |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One FDD carrier frequency is used |
| Downlink Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For both cells in the test |
| CP length | | Normal | For both cells in the test |

| | | | |
|---|---|---|---|
| DRX | | | OFF |
| Time offset between cells | µs | 3 | Synchronous cells |
| Physical cell ID PCI | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 !=0 | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met |
| ABS pattern | | '10000000100000001000000010000000010000000' | Non-MBSFN ABS. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod 40 = 0. No MBSFN subframes are cofigured in Cell 1 or Cell 2 during the ABS subframes of Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '10000000100000001000000010000000010000000' | Configured for measurements on Cell 1. |

**Table A.9.7.3.2-2: Cell-specific test parameters for FDD UE Rx–Tx time difference measurement under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | 1 |
| Channel bandwidth ($BW_{channel}$) | MHz | 10 | 10 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | N/A |
| PDSCH allocation | $n_{PRB}$ | 13—36 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | N/A |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.5 FDD | OP.6 FDD |
| PBCH_RA | dB | 0 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | -98 |
| CRS $\hat{E}_s / N_{oc}$ | dB | -3 | 1 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 3 | dB | -3 | -0.76 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ Note 3 | dB | -6.54 | -0.76 |
| RSRP Note 4 | dBm/15 kHz | -101 | -97 |
| $(\mathrm{Io})_{meas}$ Note 4 | dBm/9 MHz | -67.89 | -67.89 |
| $(\mathrm{Io})_{nonABS}$ Note 4 | dBm/9 MHz | -65.81 | -65.81 |
| Propagation condition | | AWGN | |

NOTE 1: OCNG shall be used such that the resources in the active cell are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: $\left(\hat{E}_s / I_{ot}\right)_{meas}$ is calculated in CRS REs in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ is calculated in CRS REs in the subframes not indicated for PCell measurements by measurement resource restriction paattern.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. $(\mathrm{Io})_{meas}$ is calculated in CRS symbols in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $(\mathrm{Io})_{nonABS}$ is calculated in CRS symbols in the subframes not indicated for PCell measurements by measurement resource restriction pattern.

**Table A.9.7.3.2-3: Sounding Reference Symbol Configuration to be used in FDD UE Rx–Tx time difference test**

| Field | Value | Comment |
|---|---|---|
| UL bandwidth | 50 RBs | Same as the DL bandwidth |
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| srs-ConfigIndex | 0 | SRS periodicity of 2ms |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| srsAntennaPort | an1 | Number of SRS antenna ports |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.3.3 Test Requirements

The UE Rx–Tx time difference measurement accuracy shall fulfill the requirements in Section 9.1.9.3.

## A.9.7.4 E-UTRAN TDD UE Rx-Tx Time Difference under Time-Domain Measurement Resource Restriction with Non-MBSFN ABS

### A.9.7.4.1 Test Purpose and Environment

The purpose of this test is to verify that the TDD UE Rx-Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.9.3 when time-domain measurement resource restriction is configured for PCell measurements via higher-layer signalling [2] and non-MBSFN ABS are configured in the interfering cell.

### A.9.7.4.2 Test Parameters

In the test, there are two synchronous cells, Cell 1 and Cell 2, on the same RF channel. Cell 1 is the PCell on which UE Rx-Tx is measured, and Cell 2 is the interfering cell. Non-MBSFN ABS pattern is configured in Cell 2 during the entire test.

The tested UE is connected to the PCell and configured to transmit SRS signals periodically. The SRS configuration is provided to the UE before the measurement starts. The UE is configured to report UE Rx–Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD UE Rx-Tx time difference measurements on PCell. The information for both patterns shall be provided to the UE before the measurement starts.

The general and cell-specific parameters for this test case are defined in Table A.9.7.4.2-1 and Table A.9.7.4.2-2, respectively, and the SRS configuration used is defined in Table A.9.7.4.2-3.

**Table A.9.7.4.2-1: General test parameters for E-UTRAN TDD UE Rx-Tx time difference measurement under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | Cell to be measured |
| Neighbour cell | | Cell 2 | The cell interfering to Cell 1 |
| PCell ABS configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used |
| Downlink Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For both cells in the test |
| CP length | | Normal | For both cells in the test |
| Special subframe configuration | | 6 | For Cell 1 and Cell 2. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For Cell 1 and Cell 2. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| DRX | | | OFF |
| Time offset between cells | µs | 3 | Synchronous cells |
| Physical cell ID PCI | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 !=0 | Cell PCIs for Cell 1 and Cell 2 are selected randomly so that the condition is met. |
| ABS pattern | | '00000000010000000001' | Non-MBSFN ABS. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. Configured in Cell 2. The first/leftmost bit corresponds to the subframe #0 of a radio frame satisfying SFN mod 20 = 0. No MBSFN subframes are cofigured in the ABS subframes in Cell 2. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | '00000000010000000001' | Configured for measurements on Cell 1. |

**Table A.9.7.4.2-2: Cell-specific test parameters for E-UTRAN TDD UE Rx-Tx time difference measurement under time-domain measurement resource restriction with non-MBSFN ABS**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | N/A |
| PDSCH allocation | $n_{PRB}$ | 13—36 | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_RB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_RB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA[Note1] | dB | | |
| OCNG_RB[Note1] | dB | | |
| $N_{oc}$ [Note2] | dBm/15 kHz | -98 | -98 |
| CRS $\hat{E}_s / N_{oc}$ | dB | -3 | 1 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ [Note 3] | dB | -3 | -0.76 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ [Note 3] | dB | -6.54 | -0.76 |

| | | | |
|---|---|---|---|
| RSRP Note 4 | dBm/15 kHz | -101 | -97 |
| $(\mathrm{Io})_{meas}$ Note 4 | dBm/9 MHz | -67.89 | -67.89 |
| $(\mathrm{Io})_{nonABS}$ Note 4 | dBm/9 MHz | -65.81 | -65.81 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that the resources in the active cell are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\left(\hat{E}_s / I_{ot}\right)_{meas}$ is calculated in CRS REs in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ is calculated in CRS REs in the subframes not indicated for PCell measurements by measurement resource restriction paattern.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. $(\mathrm{Io})_{meas}$ is calculated in CRS symbols in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $(\mathrm{Io})_{nonABS}$ is calculated in CRS symbols

**Table A.9.7.4.2-3: Sounding Reference Symbol Configuration to be used in TDD UE Rx–Tx time difference test**

| Field | Value | Comment |
|---|---|---|
| UL bandwidth | 50 RBs | Same as the DL bandwidth |
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | TRUE | |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 10 | SRS periodicity of 10ms for all Tests. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.4.3 Test Requirements

The UE Rx–Tx time difference measurement accuracy shall fulfill the requirements in Section 9.1.9.3.

## A.9.7.5 E-UTRAN FDD UE Rx–Tx time difference under Time Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.7.5.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN FDD UE Rx–Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.9.4 when the UE is provided with a time-domain measurement resource restriction pattern and CRS assistance information, and when non-MBSFN ABS configured in the interfering cells.

### A.9.7.5.2 Test parameters

In this test case, there are three synchronous cells, Cell 1, Cell 2 and Cell 3, on the same RF channel. Cell 1 is the PCell on which UE Rx-Tx is measured. Cell 2 and Cell 3 are the interfering cells. A non-MBSFN ABS pattern is configured in each of the Cell 2 and Cell 3 during the entire test.

The tested UE is connected to the PCell and configured to transmit SRS signals periodically. The SRS configuration is provided to the UE before the measurement starts. The UE is configured to report UE Rx–Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN FDD intra-frequency measurements on PCell. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement patterns and the CRS assistance information shall be provided via RRC to the UE before the measurement starts.

The general and cell-specific parameters for this test case are defined in Table A.9.7.5.2-1 and Table A.9.7.5.2-2, respectively, and the SRS configuration used is specified in Table A.9.7.5.2-3.

**Table A.9.7.5.2-1: General test parameters for FDD UE Rx–Tx time difference measurement under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Serving cell (PCell) | | | Cell 1 | The measured cell |
| Neighbour cell | | | Cell 2 and Cell 3 | Cell 2 is the first interfering cell to Cell 1, whilst Cell 3 is the second interfering cell to Cell 1. |
| ABS transmission configuration | | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | | 1 | One FDD carrier frequency is used |
| Downlink Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | For all cells in the test |
| CP length | | | Normal | For all cells in the test |
| DRX | | | | OFF |
| Time offset between cells | | µs | Cell 2 offset with respect to Cell 1: 3<br>Cell 3 offset with respect to Cell 1: 2 | Three synchronous cells |
| Physical cell ID PCI | | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 =0<br>($PCI_{cell1}$ - $PCI_{cell3}$ )mod6 !=0 | Cell PCIs are selected so that both conditions are met |
| ABS pattern | | | ‘10000000100000001000000010000000010000000’ | Non-MBSFN ABS. FDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54. The first/leftmost bit corresponds to the Pcell subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (40) divided by 10. No MBSFN subframes are configured in the ABS subframes. Configured in Cell 2 and Cell 3 during the testing. |
| Time-domain measurement resource restriction pattern for PCell measurements | | | ‘10000000100000001000000010000000010000000’ | Configured for measurements on Cell 1. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation one Frame=’000000’. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = ‘000000’ | |

**Table A.9.7.5.2-2: Cell-specific test parameters for FDD UE Rx–Tx time difference measurement under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | 1 | 1 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | N/A | N/A |
| PDSCH allocation | $n_{PRB}$ | 13—36 | N/A | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | N/A | N/A |
| OCNG Patterns defined in A.3.2.1.5 (OP.5 FDD) and in A.3.2.1.6 (OP.6 FDD) | | OP.5 FDD | OP.6 FDD | OP.6 FDD |
| PBCH_RA | dB | 0 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | -98 | -98 |
| CRS $\hat{E}_s / N_{oc}$ | dB | -3 | 3 | 1 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ Note 3 | dB | -7.76 | 1.24 | -0.76 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ Note 3 | dB | -9.29 | -1.41 | -4.44 |
| RSRP Note 4 | dBm/15 kHz | -101 | -95 | -97 |
| $(\mathrm{Io})_{meas}$ Note 4 | dBm/9 MHz | -67.11 | -67.11 | -67.11 |
| $(\mathrm{Io})_{nonABS}$ Note 4 | dBm/9 MHz | -63.45 | -63.45 | -63.45 |
| Propagation condition | | AWGN | | |

NOTE 1: OCNG shall be used such that the resources in the active cell are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. Applies to all subframes.

Note 3: $\left(\hat{E}_s / I_{ot}\right)_{meas}$ is calculated in CRS REs in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ is calculated in CRS REs in the subframes not indicated for PCell measurements by measurement resource restriction paattern.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. $(\mathrm{Io})_{meas}$ is calculated in CRS symbols in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $(\mathrm{Io})_{nonABS}$ is calculated in CRS symbols in the subframes not indicated for PCell measurements by measurement resource restriction pattern.

**Table A.9.7.5.2-3: Sounding Reference Symbol Configuration to be used in FDD UE Rx–Tx time difference test**

| Field | Value | Comment |
|---|---|---|
| UL bandwidth | 50 RBs | Same as the DL bandwidth |
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |

| | | |
|---|---|---|
| Duration | TRUE | Indefinite duration |
| srs-ConfigIndex | 0 | SRS periodicity of 2ms |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| srsAntennaPort | an1 | Number of SRS antenna ports |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.5.3 Test Requirements

The UE Rx–Tx time difference measurement accuracy shall fulfill the requirements in Section 9.1.9.4.

## A.9.7.6 E-UTRAN TDD UE Rx-Tx Time Difference under Time-Domain Measurement Resource Restriction with CRS Assistance Information and Non-MBSFN ABS

### A.9.7.6.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN TDD UE Rx–Tx time difference measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.9.4 when the UE is provided with a time-domain measurement resource restriction pattern and CRS assistance information, and when non-MBSFN ABS configured in the interfering cells.

### A.9.7.6.2 Test Parameters

In this test case, there are three synchronous cells, Cell 1, Cell 2 and Cell 3, on the same RF channel. Cell 1 is the PCell on which UE Rx-Tx is measured. Cell 2 and Cell 3 are the interfering cells. A non-MBSFN ABS pattern is configured in each of the Cell 2 and Cell 3 during the entire test.

The tested UE is connected to the PCell and configured to transmit SRS signals periodically. The SRS configuration is provided to the UE before the measurement starts. The UE is configured to report UE Rx–Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE. The UE is configured by higher layers via Cell 1 with a time-domain measurement resource restriction pattern for performing E-UTRAN TDD intra-frequency measurements on PCell. The UE is also provided via higher layers with the CRS assistance information for Cell 2. The information for both measurement patterns and the CRS assistance information shall be provided via RRC to the UE before the measurement starts.

The general and cell-specific parameters for this test case are defined in Table A.9.7.6.2-1 and Table A.9.7.6.2-2, respectively, and the SRS configuration used is specified in Table A.9.7.6.2-3.

**Table A.9.7.6.2-1: General test parameters for E-UTRAN TDD UE Rx-Tx time difference measurement under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Serving cell (PCell) | | Cell 1 | Cell to be measured |
| Neighbour cell | | Cell 2 and Cell 3 | Cell 2 is the first interfering cell to Cell 1, whilst Cell 3 is the second interfering cell to Cell 1. |
| ABS transmission configuration | | Non-MBSFN ABS | As defined in Table A.3.4.1.1-1 |
| E-UTRA RF Channel Number | | 1 | One TDD carrier frequency is used |
| Downlink Channel Bandwidth ($BW_{channel}$) | MHz | 10 | For all cells in the test |
| CP length | | Normal | For all cells in the test |
| Special subframe configuration | | 6 | For all cells in the test. For special subframe configurations see Table 4.2-1 in [16]. |
| Uplink/downlink subframe configuration | | 1 | For all cells in the test. For uplink-downlink subframe configurations see Table 4.2-2 in [16]. |
| DRX | | | OFF |
| Time offset between cells | µs | Cell 2 offset with respect to Cell 1: 3<br>Cell 3 offset with respect to Cell 1: 2 | Three synchronous cells |

| | | | | |
|---|---|---|---|---|
| Physical cell ID PCI | | | ($PCI_{cell1}$ - $PCI_{cell2}$ )mod6 =0<br>($PCI_{cell1}$ - $PCI_{cell3}$ )mod6 !=0 | Cell PCIs are selected so that both conditions are met |
| ABS pattern | | | '00000000010000000001' | Non-MBSFN ABS. TDD ABS Pattern Info IE, as defined in TS 36.423 [28], clause 9.2.54.<br>The first/leftmost bit corresponds to the Pcell subframe #0 of a radio frame satisfying SFN mod x = 0, where x is the size of the bit string (20) divided by 10. No MBSFN subframes are configured in the ABS subframes. Configured in Cell 2 and Cell 3 during the testing. |
| Time-domain measurement resource restriction pattern for serving cell measurements | | | '00000000010000000001' | Configured for measurements on Cell 1. |
| CRS assistance information | physCellId | | see PCI conditions above | The CRS assistance information is provided for Cell 2 and Cell 3 in CRS-AssistanceInfo. It includes a single MBSFN-SubframeConfig element with subframe allocation one Frame='000000'. |
| | antennaPortsCount | | 1 | |
| | mbsfn-SubframeConfigList | | *oneFrame* = '000000' | |

**Table A.9.7.6.2-2: Cell-specific test parameters for E-UTRAN TDD UE Rx-Tx time difference measurement under time-domain measurement resource restriction with CRS assistance information and non-MBSFN ABS**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 |
|---|---|---|---|---|
| E-UTRAN RF Channel Number | | 1 | 1 | 1 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | N/A | N/A |
| PDSCH allocation | $n_{PRB}$ | 13—36 | N/A | N/A |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | N/A | N/A |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | OP.1 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | Non-ABS and ABS subframe channel powers defined in Table A.3.4.1.1-1. | |
| PBCH_RB | dB | | | |
| PSS_RA | dB | | | |
| SSS_RA | dB | | | |
| PCFICH_RB | dB | | | |
| PHICH_RA | dB | | | |
| PHICH_RB | dB | | | |
| PDCCH_RA | dB | | | |
| PDCCH_RB | dB | | | |
| PDSCH_RA | dB | | | |
| PDSCH_RB | dB | | | |
| OCNG_RA[Note1] | dB | | | |
| OCNG_RB[Note1] | dB | | | |
| $N_{oc}$ [Note2] | dBm/15 kHz | -98 | -98 | -98 |
| CRS $\hat{E}_s / N_{oc}$ | dB | -3 | 3 | 1 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{meas}$ [Note 3] | dB | -7.76 | 1.24 | -0.76 |
| CRS $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ [Note 3] | dB | -9.29 | -1.41 | -4.44 |
| RSRP [Note 4] | dBm/15 kHz | -101 | -95 | -97 |
| $(\mathrm{Io})_{meas}$ [Note 4] | dBm/9 MHz | -67.11 | -67.11 | -67.11 |
| $(\mathrm{Io})_{nonABS}$ [Note 4] | dBm/9 MHz | -63.45 | -63.45 | -63.45 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that the resources in the active cell are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\left(\hat{E}_s / I_{ot}\right)_{meas}$ is calculated in CRS REs in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $\left(\hat{E}_s / I_{ot}\right)_{nonABS}$ is calculated in CRS REs in the subframes not indicated for PCell measurements by measurement resource restriction paattern.

Note 4: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. $(\mathrm{Io})_{meas}$ is calculated in CRS symbols in the subframes indicated for PCell measurements by measurement resource restriction pattern, whilst $(\mathrm{Io})_{nonABS}$ is calculated in CRS symbols

**Table A.9.7.6.2-3: Sounding Reference Symbol Configuration to be used in TDD UE Rx–Tx time difference test**

| Field | Value | Comment |
|---|---|---|
| UL bandwidth | 50 RBs | Same as the DL bandwidth |
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | TRUE | |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 10 | SRS periodicity of 10ms for all Tests. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.6.3 Test Requirements

The UE Rx–Tx time difference measurement accuracy shall fulfill the requirements in Section 9.1.9.4.

## A.9.7.7 E-UTRAN FDD UE Rx-Tx time difference case for Cat-M1/M2 UE in CEModeA

### A.9.7.7.1 Test Purpose and Environment

The purpose of this test is to verify that Cat-M1 and Cat-M2 UE can meet the E-UTRAN FDD UE Rx-Tx time difference measurement accuracy requirements. Requirements for Cat-M1 UE is specified in Clause 9.1.21.21 and requirements for Cat-M2 UE is specified in Clause 9.1.25.25.

There is only one active cell in the test. The tested UE is connected with the PCell, configured to transmit SRS signals periodically, and signaled to report UE Rx-Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE.

### A.9.7.7.2 Test parameters

The parameters for this test case are defined in Table A.9.7.7.2-1, and the SRS configuration used is defined in Table A.9.7.7.2-2.

**Table A.9.7.7.2-1: FDD UE Rx-Tx time difference test parameters for Cat-M1/M2 UE in CEModeA**

| Parameter | Unit | Test 1 |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 |
| DRX | | OFF |
| PRACH Configuration | | PRACH_4CE As specified in A.3.16 |
| MPDCCH Reference measurement channel[Note1] | | R.16 FDD |
| OCNG Pattern[Note2] | | OP.21 FDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| MPDCCH_RA | dB | |
| MPDCCH_RB | dB | |
| OCNG_RA[Note3] | dB | |
| OCNG_RB[Note3] | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| $\hat{E}_s / I_{ot}$ | dB | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 |
| Propagation Condition | | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

**Table A.9.7.7.2-2: Sounding Reference Symbol Configuration to be used in FDD UE Rx-Tx time difference test for Cat-M1/M2 UE in CEModeA**

| Field | Test 1 | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | SRS periodicity of 2ms for all Tests. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |

Note: For further information see clause 6.3.2 in TS 36.331.

## A.9.7.7.3 Test Requirements

For Cat-M1 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.21.21.

For Cat-M2 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.25.25.

## A.9.7.8 E-UTRAN HD-FDD UE Rx-Tx time difference case for Cat-M1/M2 UE in CEModeA

### A.9.7.8.1 Test Purpose and Environment

The purpose of this test is to verify that Cat-M1 and Cat-M2 UE can meet the E-UTRAN HD-FDD UE Rx-Tx time difference measurement accuracy requirements. Requirements for Cat-M1 UE is specified in Clause 9.1.21.21 and requirements for Cat-M2 UE is specified in Clause 9.1.25.25.

There is only one active cell in the test. The tested UE is connected with the PCell, configured to transmit SRS signals periodically, and signaled to report UE Rx-Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE.

### A.9.7.8.2 Test parameters

The parameters for this test case are defined in Table A.9.7.8.2-1, and the SRS configuration used is defined in Table A.9.7.8.2-2.

**Table A.9.7.8.2-1: HD-FDD UE Rx-Tx time difference test parameters for Cat-M1/M2 UE in CEModeA**

| Parameter | Unit | Test 1 |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 |
| DRX | | OFF |
| PRACH Configuration | | PRACH_4CE As specified in A.3.16 |
| MPDCCH Reference measurement channel[Note1] | | R.6 HD FDD |
| OCNG Pattern[Note2] | | OP.21 FDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| MPDCCH_RA | dB | |
| MPDCCH_RB | dB | |
| OCNG_RA[Note3] | dB | |
| OCNG_RB[Note3] | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| $\hat{E}_s / I_{ot}$ | dB | 3 |
| Io[Note4] | dBm/9 MHz | -65.5 |
| Propagation Condition | | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

**Table A.9.7.8.2-2: Sounding Reference Symbol Configuration to be used in HD-FDD UE Rx-Tx time difference test for Cat-M1/M2 UE in CEModeA**

| Field | Test 1 | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc1 | |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | N/A | Not applicable for FDD |

| | | |
|---|---|---|
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 0 | SRS periodicity of 2ms for all Tests. |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.8.3 Test Requirements

For Cat-M1 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.21.21.

For Cat-M2 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.25.25.

## A.9.7.9 E-UTRAN TDD UE Rx-Tx time difference case for Cat-M1/M2 UE in CEModeA

### A.9.7.9.1 Test Purpose and Environment

The purpose of this test is to verify that Cat-M1 and Cat-M2 UE can meet the E-UTRAN TDD UE Rx-Tx time difference measurement accuracy requirements. Requirements for Cat-M1 UE is specified in Clause 9.1.21.21 and requirements for Cat-M2 UE is specified in Clause 9.1.25.25.

There is only one active cell in the test. The tested UE is connected with the PCell, configured to transmit SRS signals periodically, and signaled to report UE Rx-Tx time difference measurement. The test equipment measures the transmit timing of the UE using the transmitted SRS, and measures the receive timing using the downlink CRS. The test equipment then compares the difference of these two timings to the UE Rx-Tx measurement reported by the UE.

### A.9.7.9.2 Test parameters

The parameters for this test case are defined in Table A.9.7.9.2-1, and the SRS configuration used is defined in Table A.9.7.9.2-2.

**Table A.9.7.9.2-1: TDD UE Rx-Tx time difference test parameters for Cat-M1/M2 UE in CEModeA**

| Parameter | Unit | Test 1 |
|---|---|---|
| E-UTRAN RF Channel Number | | 1 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 |
| Special subframe configuration[Note1] | | 6 |
| Uplink-downlink configuration[Note2] | | 1 |
| DRX | | OFF |
| PRACH Configuration | | PRACH_4CE As specified in A.3.16 |
| MPDCCH Reference measurement channel[Note3] | | R.14 TDD |
| OCNG Pattern[Note4] | | OP.11 TDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| MPDCCH_RA | dB | |
| MPDCCH_RB | dB | |
| OCNG_RA[Note5] | dB | |
| OCNG_RB[Note5] | dB | |
| $N_{oc}$ | dBm/15 kHz | -98 |

| | | |
|---|---|---|
| $\hat{E}_s / N_{oc}$ | dB | 3 |
| $\hat{E}_s / I_{ot}$ | dB | 3 |
| Io[Note6] | dBm/9 MHz | -65.5 |
| Propagation Condition | | AWGN |

Note 1: For the special subframe configuration see table 4.2-1 in TS 36.211.
Note 2: For the uplink-downlink configuration see table 4.2-2 in TS 36.211.
Note 3: For the reference measurement channels, see clause A.3.1.
Note 4: For the OCNG pattern, see clause A.3.2.
Note 5: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 6: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

**Table A.9.7.9.2-2: Sounding Reference Symbol Configuration to be used in TDD UE Rx-Tx time difference test for Cat-M1/M2 UE in CEModeA**

| Field | Test 1 | Comment |
|---|---|---|
| srsBandwidthConfiguration | bw5 | |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE | |
| srsMaxUpPTS | FALSE | |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 | |
| frequencyDomainPosition | 0 | |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 15 | SRS periodicity of 10ms |
| transmissionComb | 0 | |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note: For further information see clause 6.3.2 in TS 36.331. | | |

### A.9.7.9.3 Test Requirements

For Cat-M1 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.21.21.

For Cat-M2 UE, the UE Rx-Tx time difference measurement accuracy shall fulfill the requirements in Clause 9.1.25.25.

## A.9.8 RSTD

## A.9.8.1 E-UTRAN FDD RSTD intra frequency case

### A.9.8.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSTD intra-frequency measurement accuracy is within the specified limits in clause 9.1.10.1 in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{\text{RSTD IntraFreqFDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.1.1-1 and A.9.8.1.1-2 during this time.

The test parameters are given in Table A.9.8.1.1-1 and Table A.9.8.1.1-2.

**Table A.9.8.1.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| PCFICH/PDCCH/PHICH parameters | | R.14 FDD | | R.6 FDD | | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1 | | OP.7 FDD | | OP.6 FDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 1.4 | | 10 | | |
| PRS Bandwidth | RB | 6 | | 50 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{PR}$ | | 12 | | 2 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 6 | | 1 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | us | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | us | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | us | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTD\,IntraFreqFDD,\,E\text{-}UTRAN}$ | ms | 2560 | | | | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.1 |

**Table A.9.8.1.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | | |
| PSS_RA | | | | | | | | | |
| SSS_RA | | | | | | | | | |
| PCFICH_RB | | | | | | | | | |
| PHICH_RA | | | | | | | | | |
| PHICH_RB | | | | | | | | | |
| PDCCH_RA | | | | | | | | | |
| PDCCH_RB | | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | | |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -2.37 | -8.02 | -6 | -13 | -2.37 | -8.02 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -3 | -10 | -6 | -13 | -3 | -10 | -6 | -13 |
| Io Note3 | dBm/1.08 MHz | -78.92 | -78.92 | -79.21 | -79.21 | N/A | N/A | N/A | N/A |
| | dBm/9 MHz | N/A | N/A | N/A | N/A | -69.72 | -69.72 | -70 | -70 |
| PRP Note3 | dBm/15kHz | -100.37 | -106.02 | -104 | -111 | -100.37 | -106.02 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2.37 | -8.02 | -3 | -13 | -2.37 | -8.02 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -100.37 | -106.02 | -101 | -111 | -100.37 | -106.02 | -101 | -111 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

## A.9.8.1.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.1.

## A.9.8.1.2A Test Requirements for UE Category 1bis

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.5. The test parameters given in Table A.9.8.1.1-1 and Table A.9.8.1.1-2 shall be applied with the exceptions given in Table A.9.8.1.2A-1.

**Table A.9.8.1.2A-1: Specific test parameters for UE Category for 1Bis intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| $T_{RSTD\,IntraFreqFDD,\,E\text{-}UTRAN}$ | s | 5.12 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.3 |

## A.9.8.2 E-UTRAN TDD RSTD intra frequency case

### A.9.8.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSTD intra-frequency measurement accuracy is within the specified limits in clause 9.1.10.1 in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{\text{RSTD IntraFreqTDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.2.1-1 and A.9.8.2.1-2 during this time.

The test parameters are given in Table A.9.8.2.1-1 and Table A.9.8.2.1-2.

**Table A.9.8.2.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| PCFICH/PDCCH/PHICH parameters | | R.14 TDD | | R.6 TDD | | As specified in clause A.3.1.2.2 |
| OCNG Patterns defined in A.3.2.2 | | OP.4 TDD | | OP.2 TDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One TDD carrier frequency is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 1.4 | | 10 | | |
| PRS Bandwidth | RB | 6 | | 50 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Special subframe configuration | | 6 | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | 3 | | 1 | | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. The same configuration in both cells. |
| PRS configuration Index $I_{\text{PR}}$ | | 9 | | 14 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{\text{PRS}}$ | | 6 | | 1 | | As defined in TS 36.211 |

| | | | | | | |
|---|---|---|---|---|---|---|
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | us | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | us | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | us | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTD\,IntraFreq\,TDD,\,E\text{-}UTRAN}$ | ms | 2560 | | | | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.2 |

**Table A.9.8.2.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -2.37 | -8.02 | -6 | -13 | -2.37 | -8.02 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -3 | -10 | -6 | -13 | -3 | -10 | -6 | -13 |
| Io Note3 | dBm/1.08 MHz | -78.92 | -78.92 | -79.21 | -79.21 | N/A | N/A | N/A | N/A |
| | dBm/9 MHz | N/A | N/A | N/A | N/A | -69.72 | -69.72 | -70 | -70 |
| PRP Note3 | dBm/15kHz | -100.37 | -106.02 | -104 | -111 | -100.37 | -106.02 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2.37 | -8.02 | -3 | -13 | -2.37 | -8.02 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -100.37 | -106.02 | -101 | -111 | -100.37 | -106.02 | -101 | -111 |
| Propagation condition | | AWGN | | | | | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS. |

### A.9.8.2.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.1.

### A.9.8.2.2A Test Requirements for UE Category 1bis

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.5. The test parameters given in Table A.9.8.2.1-1 and Table A.9.8.2.1-2 shall be applied with the exceptions given in Table A.9.8.2.2A-1.

**Table A.9.8.2.2A-1: Specific test parameters for UE Category for 1Bis intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| $T_{RSTD\,IntraFreqHDD,\,E\text{-}UTRAN}$ | s | 5.12 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.4 |

## A.9.8.3 E-UTRAN FDD-FDD RSTD inter frequency case

### A.9.8.3.1 Test Purpose and Environment

The purpose of these tests is to verify that the RSTD inter-frequency measurement accuracy is within the specified limits in clause 9.1.10.2 in AWGN channels.

There are two synchronous cells on different carrier frequencies in the test. In all test cases, Cell 1 is the reference cell as well as the PCell and Cell 2 the neighbor cell. The inter frequency measurements on Cell 2 are supported by measurement gaps. PCIs of the two cells are selected randomly.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD\,InterFreqHDD,\,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Table A.9.8.3.1-1 and Table A.9.8.3.1-2 for each of the two cells during this time.

The test parameters are given in Table A.9.8.3.1-1 and Table A.9.8.3.1-2.

**Table A.9.8.3.1-1: General Test Parameters for inter frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| PCFICH/PDCCH/PHICH parameters | | R.14 FDD | R.6 FDD | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1 | | OP.7 FDD | OP.6 FDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |

| | | | | |
|---|---|---|---|---|
| Reference cell | | Cell 1 | | Cell 1 on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 on RF channel number 2 |
| E-UTRA RF Channel Number | | 1,2 | | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 1.4 | 10 | |
| PRS Bandwidth | RB | 6 | 50 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 6 | 1 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell1:'11110000'<br>Cell2:'11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| expectedRSTD | µs | Cell 2:1<br>Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame transmit time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | Synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| $T_{RSTD\,InterFreqFDD,\,E\text{-}UTRAN}$ | ms | 5120 | | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.6.1 |

**Table A.9.8.3.1-2: Cell Specific Test Parameters for inter frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| GapOffset | | 18 | N/A | 11 | N/A |
| Gap Pattern ID | | 0 | N/A | 0 | N/A |
| PRS configuration Index $I_{PR}$ | | 12 | 19 | 2 | 12 |
| PRS subframe offset | | N/A | 7 | N/A | 10 |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 |
| PRS_RA | dB | -3 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -13 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -6 | -13 | -6 | -13 |
| Io Note3 | dBm/1.08 MHz | -79.25 | -79.39 | N/A | N/A |
| | dBm/9 MHz | N/A | N/A | -70.04 | -70.18 |
| PRP Note3 | dBm/15kHz | -104 | -111 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -3 | -13 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -101 | -111 | -101 | -111 |
| Propagation condition | | AWGN | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS. |

### A.9.8.3.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.2.

### A.9.8.3.2A Test Requirements for UE Category 1bis

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.6. The test parameters given in Table A.9.8.3.1-1 and Table A.9.8.3.1-2 shall be applied with the exceptions given in Table A.9.8.3.2A-1.

**Table A.9.8.3.2A-1: Specific test parameters for UE Category for 1Bis inter frequency RSTD Tests for E-UTRAN FDD-FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| $T_{RSTD\,IntraFreqFDD,\,E\text{-}UTRAN}$ | s | 10.24 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.5 |

## A.9.8.4 E-UTRAN TDD-TDD RSTD inter frequency case

### A.9.8.4.1 Test Purpose and Environment

The purpose of this test is to verify that the RSTD inter-frequency measurement accuracy is within the specified limits in clause 9.1.10.2 in AWGN channels.

There are two synchronous cells on different carrier frequencies in the test. In all test cases, Cell 1 is the reference cell as well as the PCell and Cell 2 is the neighbour cell. The inter frequency measurements on Cell 2 are supported by a measurement gap. PCIs of the two cells are selected randomly.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD\,InterFreqTDD,\,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Table A.9.8.4.1-1 and Table A.9.8.4.1-2 for each of the two cells during this time.

The test parameters are given in Table A.9.8.4.1-1 and Table A.9.8.4.1-2.

**Table A.9.8.4.1-1: General Test Parameters for inter frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| PCFICH/PDCCH/PHICH parameters | | R.14 TDD | R.6 TDD | As specified in clause A.3.1.2.2 |
| OCNG Patterns defined in A.3.2.2 | | OP.4 TDD | OP.2 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |

| | | | | |
|---|---|---|---|---|
| Reference cell | | Cell 1 | | Cell 1 on RF channel number 1 |
| Neighbour cell | | Cell 2 | | Cell 2 on RF channel number 2 |
| E-UTRA RF Channel Number | | 1,2 | | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 1.4 | 10 | |
| PRS Bandwidth | RB | 6 | 50 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Special subframe configuration | | 6 | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | 3 | 1 | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. |
| Number of consecutive positioning downlink subframes $N_{\mathrm{PRS}}$ | | 6 | 1 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell1:‘11110000’ Cell2:‘11110000’ | | PRS muting is not used. See clause 6.5.1.2 in TS 36.355 for more information |
| expectedRSTD | µs | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The list includes the reference cell (received in *OTDOA-ReferenceCellInfo* [24]) on RF channel 1 and 15 other cells on RF channel 2, all received in *OTDOA-ProvideAssistanceData* [24]. |
| $T_{\mathrm{RSTD\,InterFreqTDD,\,E\text{-}UTRAN}}$ | ms | 5120 | | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.6.3 |

**Table A.9.8.4.1-2: Cell Specific Test Parameters for inter frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap pattern ID | | 0 | N/A | 0 | N/A |
| Gapoffset | | 34 | N/A | 13 | N/A |
| PRS configuration Index $I_{\mathrm{PR}}$ | | 15 | 35 | 4 | 14 |
| PRS subframe offset | | N/A | 20 | N/A | 10 |
| PBCH_RA | dB | 0 | | | |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| PRS_RA | dB | -3 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -13 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -6 | -13 | -6 | -13 |
| Io Note3 | dBm/1.08 MHz | -79.25 | -79.39 | N/A | N/A |
| | dBm/9 MHz | N/A | N/A | -70.04 | -70.18 |
| PRP Note3 | dBm/15kHz | -104 | -111 | -104 | -111 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -3 | -13 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -101 | -111 | -101 | -111 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS.

### A.9.8.4.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.2.

### A.9.8.4.2A Test Requirements for UE Category 1bis

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.10.6. The test parameters given in Table A.9.8.4.1-1 and Table A.9.8.4.1-2 shall be applied with the exceptions given in Table A.9.8.4.2A-1.

**Table A.9.8.4.2A-1: Specific test parameters for UE Category for 1Bis inter frequency RSTD Tests for E-UTRAN TDD-TDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PRS muting info | | Cell 1: '1111111100000000'<br>Cell 2: '1111111100000000' | Correponds to prs-MutingInfo defined in TS 36.355 [24] |
| $T_{RSTD\ IntraFreqFDD,\ E\text{-}UTRAN}$ | s | 10.24 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.7 |

## A.9.8.5 E-UTRAN FDD RSTD Measurement Accuracy in Carrier Aggregation

### A.9.8.5.1 Test Purpose and Environment

The purpose of these tests is to verify that the E-UTRAN FDD RSTD measurement accuracy in carrier aggregation is within the specified limits in clause 9.1.12.

There are three synchronous cells on two different carrier frequencies in the test. Cell 1 is the PCell on primary component carrier F1 (RF channel number 1), Cell 2 is the SCell and reference cell on sceondary component carrier F2 (RF channel number 2), and Cell 3 is the neighbor cell on F2.

Cell2 and Cell3 are included in the OTDOA assistance data, whilst Cell1 is not included in the OTDOA assistance data. The RSTD measurements are performed between Cell 2 and Cell 3 to verify that when both the reference cell and neighbouring cell belong to the secondary component carrier the RSTD measurement accuracy can meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap is not configured in the test because of UE carrier aggregation capability.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD\ IntraFreqFDD,\ E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Table A.9.8.5.1-1 and Table A.9.8.5.1-2 for each of the three cells during this time.

The test parameters are given in Table A.9.8.5.1-1 and Table A.9.8.5.1-2.

**Table A.9.8.5.1-1: General Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.6 FDD | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1 | | OP.6 FDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Assistance data reference cell | | Cell 2 | Cell 2 is the SCell on RF channel number 2 |
| PCell | | Cell 1 | Cell 1 on RF channel number 1 |
| Neighbour cell | | Cell 3 | Cell 3 on RF channel number 2 |
| E-UTRA RF Channel Number | | 1,2 | Two FDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Bandwidth | RB | 50 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 1 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell1:'11110000'<br>Cell2:'11110000'<br>Cell3:'11110000' | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 2 – Cell ID of cell 3) mod 6 = 3 | PCI of cell 1 is selected randomly. |
| expectedRSTD | µs | Cell 3:-2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | |
| DRX | | OFF | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 2: -1<br>Cell 3 to Cell 2:1 | PRS are transmitted from synchronous cells |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the assistance-data-reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. All cells provided in OTDOA assistance data are on RF channel 2. |
| $T_{RSTD\ IntraFreqFDD,\ E\text{-}UTRAN}$ | ms | 2560 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.1 |

**Table A.9.8.5.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| PRS configuration Index $I_{PR}$ | | 2 | 2 | 2 |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| PRS_RA | dB | -3 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ | dB | -6 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -70.04 | -70.01 | -70.01 |
| PRP Note3 | dBm/15kHz | -104 | -104 | -111 |
| RSRP Note3 | dBm/15kHz | -101 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note3 | dB | -3 | -6 | -13 |
| Propagation condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, RSRP, Io and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS.

### A.9.8.5.2 Test Requirements

The measurement accuracy of RSTD between Cell2 and Cell3 shall fulfill the requirements in clause 9.1.12.

## A.9.8.6 E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation

### A.9.8.6.1 Test Purpose and Environment

The purpose of these tests is to verify that the E-UTRAN TDD RSTD measurement accuracy in carrier aggregation is within the specified limits in clause 9.1.12.

There are three synchronous cells on two different carrier frequencies in the test. Cell 1 is the PCell on primary component carrier F1 (RF channel number 1), Cell 2 is the SCell and reference cell on sceondary component carrier F2 (RF channel number 2), and Cell 3 is the neighbor cell on F2.

Cell2 and Cell3 are included in the OTDOA assistance data, whilst Cell1 is not included in the OTDOA assistance data. The RSTD measurements are performed between Cell 2 and Cell 3 to verify that when both the reference cell and neighbouring cell belong to the secondary component carrier the RSTD measurement accuracy can meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap is not configured in the test because of UE carrier aggregation capability.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{\text{RSTD IntraFreqTDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Table A.9.8.6.1-1 and Table A.9.8.6.1-2 for each of the three cells during this time.

The test parameters are given in Table A.9.8.6.1-1 and Table A.9.8.6.1-2.

**Table A.9.8.6.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.6 TDD | As specified in clause A.3.1.2.2 |
| OCNG Patterns defined in A.3.2.2 | | OP.2 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Assistance data reference cell | | Cell 2 | Cell 2 is the SCell on RF channel number 2 |
| PCell | | Cell 1 | Cell 1 on RF channel number 1 |
| Neighbour cell | | Cell 3 | Cell 3 on RF channel number 2 |
| E-UTRA RF Channel Number | | 1,2 | Two TDD carrier frequencies are used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| PRS Bandwidth | RB | 50 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{\text{PRS}}$ | | 1 | As defined in TS 36.211 |
| Special subframe configuration | | **6** | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | **1** | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. The same configuration in both cells. |
| prs-MutingInfo | | Cell1:‘11110000’<br>Cell2:‘11110000’<br>Cell3:’11110000’ | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 2 – Cell ID of cell 3) mod 6 = 3 | PCI of cell 1 is selected randomly. |
| expectedRSTD | µs | Cell 3:-2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | |
| DRX | | OFF | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 2: -1<br>Cell 3 to Cell 2:1 | PRS are transmitted from synchronous cells |
| Time alignment error between cell2 and cell1 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |

| | | | |
|---|---|---|---|
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the assistance-data-reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. All cells provided in OTDOA assistance data are on RF channel 2. |
| $T_{\text{RSTD IntraFreqTDD, E-UTRAN}}$ | ms | 2560 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.5.2 |

**Table A.9.8.6.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 2 |
| PRS configuration Index $I_{\text{PR}}$ | | 14 | 14 | 14 |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| OCNG_RA Note1 | | | | |
| OCNG_RB Note1 | | | | |
| PRS_RA | dB | -3 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ | dB | -6 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -70.04 | -70.01 | -70.01 |
| PRP Note3 | dBm/15kHz | -104 | -104 | -111 |
| RSRP Note3 | dBm/15kHz | -101 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note3 | dB | -3 | -6 | -13 |
| Propagation condition | | AWGN | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, RSRP, Io and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS.

## A.9.8.6.2 Test Requirements

The measurement accuracy of RSTD between Cell2 and Cell3 shall fulfill the requirements in clause 9.1.12.

## A.9.8.7 E-UTRAN FDD RSTD Measurement Accuracy in Carrier Aggregation for 20MHz bandwidth

### A.9.8.7.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.5.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.7.1-1 and A.9.8.7.1-2 will replace the values of corresponding parameters in Tables A.9.8.5.1-1 and A.9.8.5.1-2.

**Table A.9.8.7.1-1: General Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.10 FDD | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1.14 | | OP.14 FDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | |
| PRS Bandwidth | RB | 100 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Note 1: See Table A.9.8.5.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.7.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 20MHz bandwidth**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/18 MHz | -67.03 | -67.00 | -67.00 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.5.1-2 for other cell specific test parameters. | | | | |

### A.9.8.7.2 Test Requirements

The test requirements defined in section A.9.8.5.2 shall apply to this test case.

## A.9.8.8 E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation for 20MHz bandwidth

### A.9.8.8.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.6.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.8.1-1 and A.9.8.8.1-2 will replace the values of corresponding parameters in Tables A.9.8.6.1-1 and A.9.8.6.1-2.

**Table A.9.8.8.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 20MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.10 TDD | As specified in clause A.3.1.2.2 |

| | | | |
|---|---|---|---|
| OCNG Patterns defined in A.3.2.2.8 | | OP.8 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 20 | |
| PRS Bandwidth | RB | 100 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Note 1: See Table A.9.8.6.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.8.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 20MHz bandwidth**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/18 MHz | -67.03 | -67.00 | -67.00 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.6.1-2 for other cell specific test parameters. | | | | |

### A.9.8.8.2 Test Requirements

The test requirements defined in section A.9.8.6.2 shall apply to this test case.

## A.9.8.9 E-UTRAN FDD RSTD Measurement Accuracy in Carrier Aggregation for 10MHz+5MHz

### A.9.8.9.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.5.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.9.1-1 and A.9.8.9.1-2 will replace the values of corresponding parameters in Tables A.9.8.5.1-1 and A.9.8.5.1-2.

**Table A.9.8.9.1-1: General Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 10MHz+5MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | Cell1: R.6 FDD<br>Cell2: R.11 FDD<br>Cell3: R.11 FDD | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1 | | Cell1: OP.6 FDD<br>Cell2: OP.19 FDD<br>Cell3: OP.19 FDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell1: 10<br>Cell2: 5<br>Cell3: 5 | |
| PRS Bandwidth | RB | Cell1: 50<br>Cell2: 25<br>Cell3: 25 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |

| | | | |
|---|---|---|---|
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 2 | As defined in TS 36.211 |
| Note 1: See Table A.9.8.5.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.9.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 10MHz+5MHz**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/9 MHz | -70.04 | N/A | N/A |
| | dBm/4.5 MHz | N/A | -73.02 | -73.02 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.5.1-2 for other cell specific test parameters. | | | | |

### A.9.8.9.2 Test Requirements

The test requirements defined in section A.9.8.5.2 shall apply to this test case.

## A.9.8.10 E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation for 10MHz+5MHz

### A.9.8.10.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.6.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.10.1-1 and A.9.8.10.1-2 will replace the values of corresponding parameters in Tables A.9.8.6.1-1 and A.9.8.6.1-2.

**Table A.9.8.10.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 10MHz+5MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | Cell1: R.6 TDD<br>Cell2: R.11 TDD<br>Cell3: R.11 TDD | As specified in clause A.3.1.2.2 |
| OCNG Patterns defined in A.3.2.2 | | Cell1: OP.2 TDD<br>Cell2: OP.10 TDD<br>Cell3: OP.10 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell1: 10<br>Cell2: 5<br>Cell3: 5 | |
| PRS Bandwidth | RB | Cell1: 50<br>Cell2: 25<br>Cell3: 25 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 2 | As defined in TS 36.211 |
| Note 1: See Table A.9.8.6.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.10.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 10MHz+5MHz**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/9 MHz | -70.04 | N/A | N/A |

| | | | | |
|---|---|---|---|---|
| | dBm/4.5 MHz | N/A | -73.02 | -73.02 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.6.1-2 for other cell specific test parameters. | | | | |

### A.9.8.10.2 Test Requirements

The test requirements defined in section A.9.8.6.2 shall apply to this test case.

## A.9.8.11 E-UTRAN FDD RSTD Measurement Accuracy in Carrier Aggregation for 5 + 5MHz bandwidth

### A.9.8.11.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.5.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.11.1-1 and A.9.8.11.1-2 will replace the values of corresponding parameters in Tables A.9.8.5.1-1 and A.9.8.5.1-2.

**Table A.9.8.11.1-1: General Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 5+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.11 FDD | As specified in clause A.3.1.2.1 |
| OCNG Patterns defined in A.3.2.1.19 | | OP.19 FDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| PRS Bandwidth | RB | 25 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 2 | As defined in TS 36.211 |
| Note 1: See Table A.9.8.5.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.11.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation for 5+5MHz bandwidth**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/4.5 MHz | -73.05 | -73.02 | -73.02 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.5.1-2 for other cell specific test parameters. | | | | |

### A.9.8.11.2 Test Requirements

The test requirements defined in section A.9.8.5.2 shall apply to this test case.

# A.9.8.12 E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation for 5+5MHz bandwidth

## A.9.8.12.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.6.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.12.1-1 and A.9.8.12.1-2 will replace the values of corresponding parameters in Tables A.9.8.6.1-1 and A.9.8.6.1-2.

**Table A.9.8.12.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 5+5MHz bandwidth**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | R.11 TDD | As specified in clause A.3.1.2.2 |
| OCNG Patterns defined in A.3.2.2.10 | | OP.10 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 | |
| PRS Bandwidth | RB | 25 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 2 | As defined in TS 36.211 |
| Note 1: See Table A.9.8.6.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.12.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 5+5MHz bandwidth**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/4.5 MHz | -73.05 | -73.02 | -73.02 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.6.1-2 for other cell specific test parameters. | | | | |

## A.9.8.12.2 Test Requirements

The test requirements defined in section A.9.8.6.2 shall apply to this test case.

# A.9.8.13 E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation for 20MHz+10MHz

## A.9.8.13.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in subclause A.9.8.6.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.9.8.13.1-1 and A.9.8.13.1-2 will replace the values of corresponding parameters in Tables A.9.8.6.1-1 and A.9.8.6.1-2.

**Table A.9.8.13.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 20MHz+10MHz**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters | | Cell1: R.10 TDD<br>Cell2: R.6 TDD<br>Cell3: R.6 TDD | As specified in clause A.3.1.2.2 |

| | | | |
|---|---|---|---|
| OCNG Patterns defined in A.3.2.2 | | Cell1: OP.8 TDD<br>Cell2: OP.2 TDD<br>Cell3: OP.2 TDD | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). There is no PDSCH allocated in the subframe transmitting PRS. |
| Channel Bandwidth ($BW_{channel}$) | MHz | Cell1: 20<br>Cell2: 10<br>Cell3: 10 | |
| PRS Bandwidth | RB | Cell1: 100<br>Cell2: 50<br>Cell3: 50 | PRS Bandwidth bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Note 1: See Table A.9.8.6.1-1 for other general test parameters.<br>Note 2: N/A | | | |

**Table A.9.8.13.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation for 20MHz+10MHz**

| Parameter | Unit | Cell1 | Cell2 | Cell3 |
|---|---|---|---|---|
| Io Note1 | dBm/ 18MHz | -67.03 | N/A | N/A |
| | dBm/ 9MHz | N/A | -70.01 | -70.01 |
| Note 1: Io level has been derived from other parameters for information purposes. It is not settable parameter itself. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS<br>Note 2: See Table A.9.8.6.1-2 for other cell specific test parameters. | | | | |

### A.9.8.13.2 Test Requirements

The test requirements defined in section A.9.8.6.2 shall apply to this test case.

## A.9.8.14 E-UTRAN FDD RSTD Measurement Accuracy in 3DL Carrier Aggregation

### A.9.8.14.1 Test Purpose and Environment

The purpose of these tests is to verify that the E-UTRAN FDD RSTD measurement accuracy in carrier aggregation is within the specified limits in clause 9.1.12.

There are four synchronous cells on three different carrier frequencies in the test. Cell 1 is the PCell on primary component carrier F1 (RF channel number 1), Cell 2 is an SCell on secondary component carrier F2 (RF channel number 2), Cell 3 is an SCell and reference cell on secondary component carrier F3 (RF channel number 3), and Cell 4 is the neighbor cell on F3.

Cell 1, Cell2, Cell3, and Cell 4 are included in the OTDOA assistance data. The RSTD measurements are performed

- between Cell 4 and Cell 3 to verify the accuracy of RSTD measurement when the reference cell and neighbouring cell belong to the same secondary component carrier can meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

- between Cell 1 and Cell 3 to verify the accuracy of RSTD measurement between the PCell and an SCell can meet the inter-frequency RSTD accuracy requirements defined in clause 9.1.10.2.

- between Cell 2 and Cell 3 to verify the accuracy of RSTD measurement between two SCells can meet the inter-frequency RSTD accuracy requirements defined in clause 9.1.10.2.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap is not configured in the test because of UE carrier aggregation capability.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD\,InterFreqFDD,\,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Table A.9.8.14.1-1 and Table A.9.8.14.1-2 for each of the three cells during this time.

The test parameters are given in Table A.9.8.14.1-1 and Table A.9.8.14.1-2.

**Table A.9.8.14.1-1: General Test Parameters for RSTD Tests for E-UTRAN FDD for 3DL Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCell | | Cell 1 | Cell 1 on RF channel number 1 |
| SCell 1 | | Cell 2 | Cell 2 is an SCell on RF channel number 2 |
| SCell 2 (Assistance data reference cell) | | Cell 3 | Cell 3 is an SCell on RF channel number 3 |
| Neighbour cell | | Cell 4 | Cell 4 on RF channel number 3 |
| PRS configuration index $I_{PR}$ | | 171 for all cells on PCC<br>181 for all cells on SCC1<br>191 for all cells on SCC2 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{PRS}-160$ DL subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| prs-MutingInfo | | Cell1:‘11110000’<br>Cell2:‘11110000’<br>Cell3:’11110000’<br>Cell4:’11110000’ | See clause 6.5.1.2 in TS 36.355 for more information |
| prs-SubframeOffset | | Cells on PCC: 300<br>Cells on SCC1: 310<br>Cells on SCC2, except reference cell: 0 | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC1: 0<br>Cells on SCC2, except reference cell: 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| Cell ID | | (Cell ID of cell 4 – Cell ID of cell 3) mod 6 = 3 | PCIs of cell 1 and cell 2 are selected randomly. |
| expectedRSTD | µs | Cell 1: -2<br>Cell 2: 0<br>Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | |
| DRX | | OFF | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 3: 1<br>Cell 2 to Cell 3: -1<br>Cell 4 to Cell 3: 3 | PRS are transmitted from synchronous cells |

| | | | |
|---|---|---|---|
| Time alignment errors between Cell 1, Cell 2, and Cell 3 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the assistance-data-reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. Cell 1 and Cell 2 appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 4 always appears at random places in the second half of the list. |
| $T_{RSTD\,InterFreqFDD,\,E\text{-}UTRAN}$ | ms | 4960 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.6.1 |

**Table A.9.8.14.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN FDD for Carrier Aggregation**

| Parameter | Unit | Cell1 | Cell2 | Cell3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 3 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | 5,10,20 | 5,10,20 | 5,10,20 |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns defined in A.3.2.1 | | 5MHz: OP.18 FDD<br>10MHz: OP.5 FDD<br>20MHz: OP.13 FDD | 5MHz: OP.18 FDD<br>10MHz: OP.5 FDD<br>20MHz: OP.13 FDD | 5MHz: OP.18 FDD<br>10MHz: OP.5 FDD<br>20MHz: OP.13 FDD | 5MHz: OP.18 FDD<br>10MHz: OP.5 FDD<br>20MHz: OP.13 FDD |
| PRS Transmission Bandwidth (PRS transmission bandwidth depends on selected channel bandwidth. PRS are transmitted over the system bandwidth) | RB | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 |
| Number of consecutive downlink positioning subframes $N_{PRS}$. $N_{PRS}$ also depends on selected channel bandwidth. As defined in TS 36.211 [16]. The number of subframes in a positioning occasion | | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | | | | | |
| PRS_RA | dB | -3 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -6 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ | dB | -6 | -6 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -70.04 +10log ($N_{RB,c}$ /50) | -70.04 +10log ($N_{RB,c}$ /50) | -70.01 +10log ($N_{RB,c}$ /50) | -70.01 +10log ($N_{RB,c}$ /50) |
| PRP Note3 | dBm/15kHz | -104 | -104 | -104 | -111 |
| RSRP Note3 | dBm/15kHz | -101 | -104 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note3 | dB | -3 | -6 | -6 | -13 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, RSRP, Io and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS.

### A.9.8.14.2 Test Requirements

The measurement accuracy of RSTD between Cell1 and Cell3 shall fulfill the requirements in clause 9.1.12.2

The measurement accuracy of RSTD between Cell2 and Cell3 shall fulfill the requirements in clause 9.1.12.2

The measurement accuracy of RSTD between Cell4 and Cell3 shall fulfill the requirements in clause 9.1.12.1.

## A.9.8.15 E-UTRAN TDD RSTD Measurement Accuracy in 3DL Carrier Aggregation

### A.9.8.15.1 Test Purpose and Environment

The purpose of these tests is to verify that the E-UTRAN TDD RSTD measurement accuracy in carrier aggregation is within the specified limits in clause 9.1.12.

There are four synchronous cells on three different carrier frequencies in the test. Cell 1 is the PCell on primary component carrier F1 (RF channel number 1), Cell 2 is an SCell on secondary component carrier F2 (RF channel number 2), Cell 3 is an SCell and reference cell on secondary component carrier F3 (RF channel number 3), and Cell 4 is the neighbor cell on F3.

Cell 1, Cell2, Cell3, and Cell 4 are included in the OTDOA assistance data. The RSTD measurements are performed

- between Cell 4 and Cell 3 to verify the accuracy of RSTD measurement when the reference cell and neighbouring cell belong to the same secondary component carrier can meet the intra-frequency RSTD accuracy requirements defined in clause 9.1.10.1.

- between Cell 1 and Cell 3 to verify the accuracy of RSTD measurement between the PCell and an SCell can meet the inter-frequency RSTD accuracy requirements defined in clause 9.1.10.2.

- between Cell 2 and Cell 3 to verify the accuracy of RSTD measurement between two SCells can meet the inter-frequency RSTD accuracy requirements defined in clause 9.1.10.2.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap is not configured in the test because of UE carrier aggregation capability.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{\text{RSTD InterFreqTDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Table A.9.8.15.1-1 and Table A.9.8.15.1-2 for each of the three cells during this time.

The test parameters are given in Table A.9.8.15.1-1 and Table A.9.8.15.1-2.

**Table A.9.8.15.1-1: General Test Parameters for RSTD Tests for E-UTRAN TDD for 3DL Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| PCell | | Cell 1 | Cell 1 on RF channel number 1 |
| SCell 1 | | Cell 2 | Cell 2 is an SCell on RF channel number 2 |
| SCell 2 (Assistance data reference cell) | | Cell 3 | Cell 3 is an SCell on RF channel number 3 |
| Neighbour cell | | Cell 4 | Cell 4 on RF channel number 3 |
| E-UTRA RF Channel Number | | 1,2,3 | Three TDD carrier frequencies are used. |
| PRS configuration index $I_{\text{PR}}$ | | 171 for all cells on PCC<br>181 for all cells on SCC1<br>191 for all cells on SCC2 | This corresponds to periodicity of 320 ms and PRS subframe offset of $I_{\text{PRS}}-160_{\text{DL}}$ subframes, as defined in TS 36.211 [16], Table 6.10.4.3-1 |
| prs-MutingInfo | | Cell1:‘11110000’<br>Cell2:‘11110000’<br>Cell3:’11110000’<br>Cell4:’11110000’ | See clause 6.5.1.2 in TS 36.355 for more information |
| prs-SubframeOffset | | Cells on PCC: 300<br>Cells on SCC1: 310<br>Cells on SCC2, except reference cell: 0 | Subframe offset, counted in full subframes. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | Cells on PCC: 0<br>Cells on SCC1: 0<br>Cells on SCC2, except reference cell: 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell. The corresponding parameter in the OTDOA assistance data is slotNumberOffset specified in TS 36.355 [24]. |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | 1 | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. The same configuration in both cells. |
| Cell ID | | (Cell ID of cell 4 – Cell ID of cell 3) mod 6 = 3 | PCIs of cell 1 and cell 2 are selected randomly. |
| expectedRSTD | μs | Cell 1: -2<br>Cell 2: 0<br>Cell 4: 2<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |

| | | | |
|---|---|---|---|
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| CP length | | Normal | |
| DRX | | OFF | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 1 to Cell 3: 1<br>Cell 2 to Cell 3: -1<br>Cell 4 to Cell 3: 3 | PRS are transmitted from synchronous cells |
| Time alignment errors between Cell 1, Cell 2, and Cell 3 | µs | ≤ Time alignment error as specified in 3GPP TS 36.104 [30] clause 6.5.3.1. | The value of time alignment error depends upon the type of carrier aggregation. |
| Number of cells provided in OTDOA assistance data | | 16 | The list includes the assistance-data-reference cell (received in *OTDOA-ReferenceCellInfo* [24]) and 15 other cells, all received in *OTDOA-ProvideAssistanceData* [24]. Cell 1 and Cell 2 appears at random places in the first half of the neighbour cell list in the OTDOA assistance data. Cell 4 always appears at random places in the second half of the list. |
| $T_{\text{RSTD InterFreqTDD, E-UTRAN}}$ | ms | 4960 | Derived according to the RSTD measurement requirements specified in Clause 8.1.2.6.3 |

**Table A.9.8.15.1-2: Cell Specific Test Parameters for RSTD Tests for E-UTRAN TDD for Carrier Aggregation**

| Parameter | Unit | Cell1 | Cell2 | Cell3 | Cell 4 |
|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 | 3 | 3 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5,10,20 | 5,10,20 | 5,10,20 | 5,10,20 |
| PCFICH/PDCCH/PHICH parameters as specified in clause A.3.1.2.2 | | 5MHz: R11 TDD<br>10MHz: R6 TDD<br>20MHz: R10 TDD | 5MHz: R11 TDD<br>10MHz: R6 TDD<br>20MHz: R10 TDD | 5MHz: R11 TDD<br>10MHz: R6 TDD<br>20MHz: R10 TDD | 5MHz: R11 TDD<br>10MHz: R6 TDD<br>20MHz: R10 TDD |
| OCNG Patterns defined in A.3.2.2 ( There is no PDSCH allocated in the subframe transmitting PRS) | | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD | 5MHz: OP.10 TDD<br>10MHz: OP.2 TDD<br>20MHz: OP.8 TDD |
| PRS Transmission Bandwidth (PRS transmission bandwidth depends on selected channel bandwidth. PRS are transmitted over the system bandwidth) | RB | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 | 5MHz: 25<br>10MHz: 50<br>20MHz:100 |
| Number of consecutive downlink positioning subframes $N_{\text{PRS}}$. | | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 | 5MHz: 2<br>10MHz: 1<br>20MHz:1 |

| | | | | | |
|---|---|---|---|---|---|
| $N_{PRS}$ also depends on selected channel bandwidth. As defined in TS 36.211 [16]. The number of subframes in a positioning occasion | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 |
| PRS_RA | dB | -3 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | |
| PRS $\hat{E}_s/N_{oc}$ | dB | -6 | -6 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ | dB | -6 | -6 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -70.04 +10log ($N_{RB,c}$ /50) | -70.04 +10log ($N_{RB,c}$ /50) | -70.01 +10log ($N_{RB,c}$ /50) | -70.01 +10log ($N_{RB,c}$ /50) |
| PRP Note3 | dBm/15kHz | -104 | -104 | -104 | -111 |
| RSRP Note3 | dBm/15kHz | -101 | -104 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note3 | dB | -3 | -6 | -6 | -13 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, RSRP, Io and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS.

### A.9.8.15.2 Test Requirements

The measurement accuracy of RSTD between Cell1 and Cell3 shall fulfill the requirements in clause 9.1.12.2

The measurement accuracy of RSTD between Cell2 and Cell3 shall fulfill the requirements in clause 9.1.12.2

The measurement accuracy of RSTD between Cell4 and Cell3 shall fulfill the requirements in clause 9.1.12.1.

## A.9.8.16 HD – FDD Intra frequency case for UE Category NB1 inband mode in normal coverage

### A.9.8.16.1 Test Purpose and Environment

The purpose of the tests is to verify that the intra frequency RSTD measurement for HD-FDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.10. Test 1 is applicable for UE supporting NPRS Type 1 and Test 2 is applicable for UE supporting NPRS Type 2.

In the tests there are three synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell12 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355, shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.16.1-1, A.9.8.16.1-2 and A.9.8.16.1-3.

**Table A.9.8.16.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 2 and eCell 1 | |
| NPDCCH parameters | | R.26 HD-FDD | As defined in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>Test2: (nprsID of Cell 1 – nprsID of Cell2)mod6=0 | As defined in TS36.366 [24] |
| NPRS Type | | Test1: Type 1<br>Test2: Type 2 | As defined in TS36.211 |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS36.355 [24] |
| NPRS muting info | | nCell 1: ‘11110000’<br>nCell 2: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | as in the following 2 rows: | |
| subframePattern10 | | ‘0111001110’ | Correponds to subframePattern10-r14 defined in TS 36.355 [24] |
| nprsSequenceInfo | | $BW_{channel}$ 5MHz: 54<br>$BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Measurement period | s | [11.52] | Derived according to the RSTD measurement period in clause 4.8.1 |

**Table A.9.8.16.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | nCell 1 | nCell 2 | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 |
| NPBCH_RA | dB | 0 | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | | | | | |
| NPRS_RA | dB | -7.5 | -9 | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -0.5 | -5 | -2.37 | -8.02 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -5.96 | -12.79 | -3.01 | -10.01 |
| Io Note 3 | dBm/ 180kHz | -78.40 | -78.40 | -85.60 | -85.60 |
| NPRP Note 3 | dBm/ 15 kHz | -98.5 | -103 | -100.37 | -106.02 |
| NRSRP Note 3 | dBm/ 15 kHz | -91 | -94 | -100.37 | -106.02 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | 7 | 4 | -2.37 | -8.02 |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.16.1-3: eCell 1 and eCell 2 specific test parameters**

| Parameter | Unit | Test1 | | | | | | Test2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | eCell 1 | | | eCell 2 | | | eCell 1 | | | eCell 2 | | |
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | | -98 | | | -98 | | |
| $\hat{E}_s/N_{oc}$ Note2 | dBm | 7 | 7 | 7 | 4 | 4 | 4 | 0 | 0 | 0 | -7 | -7 | -7 |

| | | | | | |
|---|---|---|---|---|---|
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |
| Timing offset to eCell 1 | ms | - | 3 | - | 3 |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | | | | |

### A.9.8.16.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.10.

## A.9.8.17 HD – FDD Inter frequency case for UE Category NB1 inband mode in normal coverage

### A.9.8.17.1 Test Purpose and Environment

The purpose of the tests is to verify that the intra frequency RSTD measurement for HD-FDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.11. Test 1 is applicable for UE supporting NPRS Type 1 and Test 2 is applicable for UE supporting NPRS Type 2.

In the tests there are three synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell2 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355, shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.17.1-1, A.9.8.17.1-2 and A.9.8.17.1-3.

**Table A.9.8.17.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 1 and eCell 2 | |
| NPDCCH parameters | | R.26 HD-FDD | As defined in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>Test2: (nprsID of Cell 1 – nprsID of Cell 2)mod6=0 | As defined in TS36.355 [24] |
| NPRS Type | | Test1: Type 1<br>Test2: Type 2 | As defined in TS36.211 |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| nprs-slotNumberOffset | | 0 | As defined in TS36.355 [24] |
| nprs-SubframeOffset | | 640 | As defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS36.355 [24] |
| NPRS muting info | | nCell 1: ‘1111111100000000’<br>nCell 2: ‘1111111100000000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | as in the following 3 rows: | |
| subframePattern10 | | ‘0111001110’ | Correponds to subframePattern10-r14 defined in TS 36.355 [24] |

| | | | |
|---|---|---|---|
| nprsSequenceInfo nCell1 | | $BW_{channel}$ 5MHz: 54<br>$BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| nprsSequenceInfo nCell2 | | $BW_{channel}$ 5MHz: 59<br>$BW_{channel}$ 10MHz: 135 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Measurement period | s | [20.48] | Derived according to the RSTD measurement period in clause 4.8.3 |

**Table A.9.8.17.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | nCell 1 | nCell 2 | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 22<br>eCell 2 $BW_{channel}$ 10MHz: 35 | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 22<br>eCell 2 $BW_{channel}$ 10MHz: 35 |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | 0 | 0 | 0 |
| NPRS_RA | dB | -13 | -17 | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -6 | -13 | -2.37 | -8.02 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -6 | -13 | -3.01 | -10.01 |
| Io Note 3 | dBm/ 180 kHz | -80.20 | -83.20 | -85.60 | -85.60 |
| NPRP Note 3 | dBm/ 15 kHz | -104 | -111 | -100.37 | -106.02 |
| NRSRP Note 3 | dBm/ 15 kHz | -91 | -94 | -100.37 | -106.02 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | 7 | 4 | -2.37 | -8.02 |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.17.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | Test1 | | | | | | Test2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | eCell 1 | | | eCell 2 | | | eCell 1 | | | eCell 2 | | |
| | | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | | -98 | | | -98 | | |
| $\hat{E}_s/N_{oc}$ Note2 | dBm | 7 | 7 | 7 | 4 | 4 | 4 | 0 | 0 | 0 | -7 | -7 | -7 |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.9.8.17.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.11.

## A.9.8.18 HD – FDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage

### A.9.8.18.1 Test Purpose and Environment

The purpose of the tests is to verify that the intra frequency RSTD measurement for HD-FDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.12. Test 1 is applicable for UE supporting NPRS Type 1 and Test 2 is applicable for UE supporting NPRS Type 2.

In the tests there are three synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell2 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355, shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.18.1-1, A.9.8.18.1-2 and A.9.8.18.1-3.

**Table A.9.8.18.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 1 and eCell 2 | |
| NPDCCH parameters | | R.26 HD-FDD | As defined in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>Test2: (nprsIC of Cell 1 – nprsID of Cell 2)mod6 = 0 | As defined in TS36.355 [24] |
| NPRS Type | | Test1: Type 1<br>Test2: Type 2 | As defined in TS36.211 |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS36.355 [24] |
| NPRS muting info | | nCell 1: '11110000'<br>nCell 2: '11110000' | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | as in the following 2 rows: | |
| subframePattern10 | | '0111001110' | Correponds to subframePattern10-r14 defined in TS 36.355 [24] |
| nprsSequenceInfo | | $BW_{channel}$ 5MHz: 54<br>$BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Measurement period | s | [11.52] | Derived according to the RSTD measurement period in clause 4.8.2 |

**Table A.9.8.18.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | nCell 1 | nCell 2 | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 17<br>eCell 2 $BW_{channel}$ 10MHz: 30 |

| | | | | | |
|---|---|---|---|---|---|
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | 0 | 0 | 0 |
| NPRS_RA | dB | -12.7 | -0.7 | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -110 | -110 | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -14.7 | -12.7 | -5 | -13 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -14.97 | -14.82 | -5.21 | -14.19 |
| Io Note 3 | dBm/ 180kHz | -100.8 | -100.8 | -87.08 | -87.08 |
| NPRP Note 3 | dBm/ 15 kHz | -124.7 | -122.7 | -103 | -111 |
| NRSRP Note 3 | dBm/ 15 kHz | -112 | -122 | -103 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2 | -12 | -5 | -13 |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.18.1-3: eCell 1 and eCell 2 specific test parameters**

| Parameter | Unit | Test1 | | | | | | Test2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | eCell 1 | | | eCell 2 | | | eCell 1 | | | eCell 2 | | |
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD<br>$BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -110 | | | -110 | | | -98 | | | -98 | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s / N_{oc}$ Note2 | dBm | -2 | -2 | -2 | -12 | -12 | -12 | -9 | -9 | -9 | -9 | -9 | -9 |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$. | | | | | | | | | | | | | | |

### A.9.8.18.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.12.

## A.9.8.19 HD – FDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage

### A.9.8.19.1 Test Purpose and Environment

The purpose of the tests is to verify that the intra frequency RSTD measurement for HD-FDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.13. Test 1 is applicable for UE supporting NPRS Type 1 and Test 2 is applicable for UE supporting NPRS Type 2.

In the tests there are three synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell2 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355, shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.19.1-1, A.9.8.19.1-2 and A.9.8.19.1-3.

**Table A.9.8.19.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 1 and eCell 2 | |
| NPDCCH parameters | | R.26 HD-FDD | As defined in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1<br>Test2: (nprsID of Cell 1 – nprsID of Cell 2)mod6 = 0 | As defined in TS36.355 [24] |
| NPRS Type | | Test1: Type 1<br>Test2: Type 2 | As defined in TS36.211 |
| nprs-period | ms | 1280 | As defined in TS36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS36.355 [24] |
| nprs-slotNumberOffset | | 0 | As defined in TS36.355 [24] |
| nprs-SubframeOffset | | 640 | As defined in TS36.355 [24] |
| NPRS muting info | | nCell 1: ‘1111111100000000’<br>nCell 2: ‘1111111100000000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration | | as in the following 3 rows: | |

| | | | |
|---|---|---|---|
| subframePattern10 | | '0111001110' | Correponds to subframePattern10-r14 defined in TS 36.355 [24] |
| nprsSequenceInfo nCell1 | | $BW_{channel}$ 5MHz: 54<br>$BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| nprsSequenceInfo nCell2 | | $BW_{channel}$ 5MHz: 59<br>$BW_{channel}$ 10MHz: 135 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-1 | Refer to A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Measurement period | s | [20.48] | Derived according to the RSTD measurement period in clause 4.8.4 |

**Table A.9.8.19.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | nCell 1 | nCell 2 | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 22<br>eCell 2 $BW_{channel}$ 10MHz: 35 | eCell 1 $BW_{channel}$ 5MHz: 17<br>eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 5MHz: 22<br>eCell 2 $BW_{channel}$ 10MHz: 35 |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | 0 | 0 | 0 |
| NPRS_RA | dB | -13 | -3 | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -110 | -110 | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -15 | -5 | -13 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -15 | -15 | -5.21 | -14.19 |
| Io Note 3 | dBm/ 180 kHz | -101.20 | -111.20 | -87.08 | -87.08 |
| NPRP Note 3 | dBm/ 15 kHz | -125 | -125 | -103 | -111 |
| NRSRP Note 3 | dBm/ 15 kHz | -112 | -122 | -103 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2 | -12 | -5 | -13 |
| Propagation Condition | | AWGN | AWGN | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 | 1x1 | 1x1 |

| | | | | | |
|---|---|---|---|---|---|
| Timing offset to nCell 1 | us | N/A | 3 | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.19.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | Test1 | | | | | | Test2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | eCell 1 | | | eCell 2 | | | eCell 1 | | | eCell 2 | | |
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| $BW_{channel}$ | MHz | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | | 5 or 10 | | |
| NOCNG Pattern defined in clause D.3 | - | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | | $BW_{channel}$ 5MHz: NOP.4 FDD $BW_{channel}$ 10MHz: NOP.1 FDD | | |
| PBCH_RA | dB | -3 | | | -3 | | | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | | | | | | | |
| PSS_RA | dB | | | | | | | | | | | | |
| SSS_RA | dB | | | | | | | | | | | | |
| PDCCH_RA | dB | | | | | | | | | | | | |
| PDCCH_RB | dB | | | | | | | | | | | | |
| PDSCH_RA | dB | | | | | | | | | | | | |
| PDSCH_RB | dB | | | | | | | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -110 | | | -110 | | | -98 | | | -98 | | |
| $\hat{E}_s/N_{oc}$ Note2 | dBm | -2 | -2 | -2 | -12 | -12 | -12 | -9 | -9 | -9 | -9 | -9 | -9 |
| Propagation Condition | | AWGN | | | AWGN | | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | ms | - | | | 3 | | | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.9.8.19.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.13.

## A.9.8.20 E-UTRAN FDD RSTD intra-frequency measurement accuracy in CE Mode A

### A.9.8.20.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE ModeA that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.20 and 9.1.25.4, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{\text{RSTD IntraFreqHDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.20.1-1 and A.9.8.20.1-2 during this time.

The test parameters are given in Table A.9.8.20.1-1 and Table A.9.8.20.1-2.

**Table A.9.8.20.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.16 FDD | | R.16 FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | | OP.21 FDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System channel Bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{\text{PR}}$ | | 151 | | 151 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{\text{PRS}}$ | | 6 | | 2 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| expectedRSTD | µs | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | Cell 2: -1 Other neighbour cells: randomly between -3 and 3 | Cell 2: -1 Other neighbour cells: randomly between -3 and 3 | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTD\ IntraFreqFDD,\ E\text{-}UTRAN}$ | ms | 5120 | | | | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.3.1 (for Cat-M1) and Clause 8.16.2.3.1 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | | | |

**Table A.9.8.20.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -2.37 | -8.02 | -6 | -13 | -2.37 | -8.02 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -3.01 | -10.01 | -6 | -13 | -3.01 | -10.01 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -69.23 | -69.23 | -70 | -70 | -69.23 | -69.23 | -70 | -70 |
| PRP Note3 | dBm/15kHz | -100.37 | -106.02 | -104 | -111 | -100.37 | -106.02 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2.37 | -8.02 | -3 | -13 | -2.37 | -8.02 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -100.37 | -106.02 | -101 | -111 | -100.37 | -106.02 | -101 | -111 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.20.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.20.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.4.

## A.9.8.21 E-UTRAN HD-FDD RSTD intra-frequency measurement accuracy in CEModeA

### A.9.8.21.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CEModeA that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.20 and 9.1.25.4, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{RSTDIntraFreqHD\text{-}FDD,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.21.1-1 and A.9.8.21.1-2 during this time.

The test parameters are given in Table A.9.8.21.1-1 and Table A.9.8.21.1-2.

**Table A.9.8.21.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN HD-FDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.6 HD-FDD | | R.6 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | | OP.21 FDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{PR}$ | | 151 | | 151 | | As defined in TS 36.211 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 6 | | 2 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTDIntraFreqHD-FDD,E-UTRAN}$ | ms | 5120 | | | | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.3.3 (for Cat-M1) and Clause 8.16.2.3.3 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | | | |

**Table A.9.8.21.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN HD-FDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -2.37 | -8.02 | -6 | -13 | -2.37 | -8.02 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -3.01 | -10.01 | -6 | -13 | -3.01 | -10.01 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -69.23 | -69.23 | -70 | -70 | -69.23 | -69.23 | -70 | -70 |
| PRP Note3 | dBm/15kHz | -100.37 | -106.02 | -104 | -111 | -100.37 | -106.02 | -104 | -111 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2.37 | -8.02 | -3 | -13 | -2.37 | -8.02 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -100.37 | -106.02 | -101 | -111 | -100.37 | -106.02 | -101 | -111 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.21.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.20.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.4.

## A.9.8.22 E-UTRAN TDD RSTD intra-frequency measurement accuracy in CE Mode A

### A.9.8.22.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode A that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.20 and 9.1.25.4, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{\text{RSTD IntraFreq TDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.22.1-1 and A.9.8.22.1-2 during this time.

The test parameters are given in Table A.9.8.22.1-1 and Table A.9.8.22.1-2.

**Table A.9.8.22.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.14 TDD | | R.14 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |

| | | | | | | |
|---|---|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.1 | | OP.11 TDD | | OP.11 TDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| Special subframe configuration | | 6 | | | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | 1 | | | | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. The same configuration in both cells. |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{PR}$ | | 154 | | 154 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 6 | | 2 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |

| | | | |
|---|---|---|---|
| $T_{RSTD\,IntraFreq\,TDD,\,E\text{-}UTRAN}$ | ms | 5120 | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.3.2 (for Cat-M1) and Clause 8.16.2.3.2 (Cat-M2) |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | |

**Table A.9.8.22.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | | |
| PSS_RA | | | | | | | | | |
| SSS_RA | | | | | | | | | |
| MPDCCH_RA | | | | | | | | | |
| MPDCCH_RB | | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | | |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -2.37 | -8.02 | -6 | -13 | -2.37 | -8.02 | -6 | -13 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -3.01 | -10.01 | -6 | -13 | -3.01 | -10.01 | -6 | -13 |
| Io Note3 | dBm/9 MHz | -69.23 | -69.23 | -70 | -70 | -69.23 | -69.23 | -70 | -70 |
| PRP Note3 | dBm/15kHz | -100.37 | -106.02 | -104 | -111 | -100.37 | -106.02 | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -2.37 | -8.02 | -3 | -13 | -2.37 | -8.02 | -3 | -13 |
| RSRP Note 3 | dBm/15kHz | -100.37 | -106.02 | -101 | -111 | -100.37 | -106.02 | -101 | -111 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.22.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.20.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.4.

## A.9.8.23 E-UTRAN FDD RSTD intra-frequency measurement accuracy in CE Mode B

### A.9.8.23.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.21 and 9.1.25.5, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{\text{RSTD IntraFreqFDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.23.1-1 and A.9.8.23.1-2 during this time.

The test parameters are given in Table A.9.8.23.1-1 and Table A.9.8.23.1-2.

**Table A.9.8.23.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.18 FDD | | R.18 FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | | OP.21 FDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System channel bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{\text{PR}}$ | | 151 | | 151 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{\text{PR}}$ | | 6 | | 4 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| expectedRSTD | µs | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | Cell 2: -1 Other neighbour cells: randomly between -3 and 3 | Cell 2: -1 Other neighbour cells: randomly between -3 and 3 | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTD\ IntraFreqFDD,\ E\text{-}UTRAN}$ | ms | 12800 | | 5120 | | Derived according to the RSTD measurement requirements specified in Clause 8.13.3.3.1 (for Cat-M1) and Clause 8.16.1.1.1 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | | | |

**Table A.9.8.23.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN FDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -5 | -13 | -15 | -15 | -5 | -13 | -15 | -15 |
| PRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -5.21 | -14.19 | -15 | -15 | -5.21 | -14.19 | -15 | -15 |
| Io Note 3 | dBm/9 MHz | -69.79 | -69.79 | -70.06 | -70.06 | -69.79 | -69.79 | -70.06 | -70.06 |
| PRP Note 3 | dBm/15kHz | -103 | -111 | -113 | -113 | -103 | -111 | -113 | -113 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -5 | -13 | -12 | -15 | -5 | -13 | -12 | -15 |
| RSRP Note 3 | dBm/15kHz | -103 | -111 | -110 | -113 | -103 | -111 | -110 | -113 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.23.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.21.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.5.

## A.9.8.24 E-UTRAN HD-FDD RSTD intra-frequency measurement accuracy in CE Mode B

### A.9.8.24.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.21 and 9.1.25.5, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{RSTDIntraFreqHD\text{-}FDD,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.24.1-1 and A.9.8.24.1-2 during this time.

The test parameters are given in Table A.9.8.24.1-1 and Table A.9.8.24.1-2.

**Table A.9.8.24.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN HD-FDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.8 HD-FDD | | R.86 HD-FDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | | OP.21 FDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System channel bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{PR}$ | | 151 | | 151 | | As defined in TS 36.211 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 6 | | 4 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTDIntraFreqHD-FDD,E-UTRAN}$ | ms | 12800 | | 5120 | | Derived according to the RSTD measurement requirements specified in Clause 8.13.3.3.3 (for Cat-M1) and Clause 8.16.3.1.3 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | | | |

**Table A.9.8.24.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN HD-FDD**

| Parameter | Unit | Test1 | | Test2 | | Test3 | | Test4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | | | | | |
| PSS_RA | | | | | | | | | |
| SSS_RA | | | | | | | | | |
| MPDCCH_RA | | | | | | | | | |
| MPDCCH_RB | | | | | | | | | |
| OCNG_RA Note1 | | | | | | | | | |
| OCNG_RB Note1 | | | | | | | | | |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -5 | -13 | -15 | -15 | -5 | -13 | -15 | -15 |
| PRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -5.21 | -14.19 | -15 | -15 | -5.21 | -14.19 | -15 | -15 |
| Io Note 3 | dBm/9 MHz | -69.79 | -69.79 | -70.06 | -70.06 | -69.79 | -69.79 | -70.06 | -70.06 |
| PRP Note 3 | dBm/15kHz | -103 | -111 | -113 | -113 | -103 | -111 | -113 | -113 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -5 | -13 | -12 | -15 | -5 | -13 | -12 | -15 |
| RSRP Note 3 | dBm/15kHz | -103 | -111 | -110 | -113 | -103 | -111 | -110 | -113 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.24.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.21.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.5.

## A.9.8.25 E-UTRAN TDD RSTD intra-frequency measurement accuracy in CE Mode B

### A.9.8.25.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD intra-frequency measurement accuracy is within the specified limits in sections 9.1.21.21 and 9.1.25.5, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell on the same frequency. Tests 1 and 2 are applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Tests 3 and 4 are applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data.

A time span of $T_{RSTDIntraFreqHD\text{-}FDD,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.25.1-1 and A.9.8.25.1-2 during this time.

The test parameters are given in Table A.9.8.25.1-1 and Table A.9.8.25.1-2.

**Table A.9.8.25.1-1: General Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Value | | | | Comment |
|---|---|---|---|---|---|---|
| | | Test1 | Test2 | Test3 | Test4 | |
| M-PDCCH parameters | | R.16 TDD | | R.16 TDD | | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | | 10 | | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts |
| OCNG Patterns defined in A.3.2.1 | | OP.11 TDD | | OP.11 TDD | | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |

| | | | | | | |
|---|---|---|---|---|---|---|
| Reference cell | | Cell 1 | | | | |
| Neighbour cell | | Cell 2 | | | | |
| E-UTRA RF Channel Number | | 1 | | | | One FDD carrier frequency is used. |
| System channel bandwidth ($BW_{channel}$) | MHz | 10 | | 10 | | |
| Special subframe configuration | | 6 | | | | As specified in table 4.2-1 in TS 36.211. The same configuration in both cells. |
| Uplink-downlink configuration | | 1 | | | | As specified in table 4.2-2 in TS 36.211 and table 8.1.2.5.2-2. The same configuration in both cells. |
| PRS Bandwidth | RB | 50 Note 1 | | 50 Note 1 | | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| PRS configuration Index $I_{PR}$ | | 154 | | 154 | | As defined in TS 36.211 |
| Number of consecutive positioning downlink subframes $N_{PR}$ | | 6 | | 4 | | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 1 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 3 | |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | 5 | 5 | |
| CP length | | Normal | | | | |
| DRX | | OFF | | | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: 3 | Cell 2 to Cell 1: -3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | | | The number of cells includes the reference cell |
| $T_{RSTD\ IntraFreq\ TDD,\ E\text{-}UTRAN}$ | Ms | 12800 | | 5120 | | Derived according to the RSTD measurement requirements specified in Clause 8.13.3.3.2 (for Cat-M1) and Clause 8.16.3.1.2 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | | | |

**Table A.9.8.25.1-2: Cell Specific Test Parameters for intra frequency RSTD Tests for E-UTRAN TDD**

| Parameter | Unit | Test1 | Test2 | Test3 | Test4 |
|---|---|---|---|---|---|

| | | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 | Cell1 | Cell2 |
|---|---|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | | | | | |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | dB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | -3 | 0 | 0 | 0 | -3 | 0 |
| $N_{oc}$ Note 2 | dBm/15 kHz | -98 | -98 | -98 | -98 | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -5 | -13 | -15 | -15 | -5 | -13 | -15 | -15 |
| PRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -5.21 | -14.19 | -15 | -15 | -5.21 | -14.19 | -15 | -15 |
| Io Note 3 | dBm/9 MHz | -69.79 | -69.79 | -70.06 | -70.06 | -69.79 | -69.79 | -70.06 | -70.06 |
| PRP Note 3 | dBm/15kHz | -103 | -111 | -113 | -113 | -103 | -111 | -113 | -113 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -5 | -13 | -12 | -15 | -5 | -13 | -12 | -15 |
| RSRP Note 3 | dBm/15kHz | -103 | -111 | -110 | -113 | -103 | -111 | -110 | -113 |
| Propagation condition | | AWGN | | | | | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.25.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.21.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.5.

## A.9.8.26 E-UTRAN FDD-FDD RSTD inter-frequency measurement accuracy in CE Mode A

### A.9.8.26.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE ModeA that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.17 and 9.1.25.1, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on FDD RF channel 1 and Cell 2 is on FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTDInterFreqFDD-FDD,E-UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.26.1-1 and A.9.8.26.1-2 during this time.

The test parameters are given in Table A.9.8.26.1-1 and Table A.9.8.26.1-2.

**Table A.9.8.26.1-1: General Test Parameters for E-UTRAN FDD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.16 FDD | R.16 FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 4 | 2 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTDInterFreqFDD-FDD,E-UTRAN}$ | ms | 15360 | 10240 | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.4.1 (for Cat-M1) and Clause 8.16.2.4.1 (Cat-M2). |

NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth.

**Table A.9.8.26.1-2: Cell Specific Test Parameters for E-UTRAN FDD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 142 | 152 | 142 | 152 |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -11 | -1 | -11 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -1 | -11 | -1 | -11 |
| Io Note3 | dBm/9 MHz | -69.68 | -70.16 | -69.68 | -70.16 |
| PRP Note3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -1 | -11 | -1 | -11 |
| RSRP Note 3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.26.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.17.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.1.

## A.9.8.27 E-UTRAN HD-FDD RSTD inter-frequency measurement accuracy in CE Mode A

### A.9.8.27.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE ModeA that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.17 and 9.1.25.1, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on FDD RF channel 1 and Cell 2 is on FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTDInterFreqHD\text{-}FDD,E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.27.1-1 and A.9.8.27.1-2 during this time.

The test parameters are given in Table A.9.8.27.1-1 and Table A.9.8.27.1-2.

**Table A.9.8.27.1-1: General Test Parameters for E-UTRAN HD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.6 HD-FDD | R.6 HD-FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 4 | 2 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |

| | | | | |
|---|---|---|---|---|
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTDInterFreqHD-FDD,E-UTRAN}$ | ms | 15360 | 10240 | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.4.1 (for Cat-M1) and Clause 8.16.2.4.1 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.9.8.27.1-2: Cell Specific Test Parameters for E-UTRAN HD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 142 | 152 | 142 | 152 |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -11 | -1 | -11 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -1 | -11 | -1 | -11 |
| Io Note3 | dBm/9 MHz | -69.68 | -70.16 | -69.68 | -70.16 |
| PRP Note3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -1 | -11 | -1 | -11 |
| RSRP Note 3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

## A.9.8.27.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.17.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.1.

# A.9.8.28 E-UTRAN TDD RSTD inter-frequency measurement accuracy in CE Mode A

## A.9.8.28.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE ModeA that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.17 and 9.1.25.1, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on TDD RF channel 1 and Cell 2 is on TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE $\Delta T$ ms before the start of measurement period, where $\Delta T$ = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{\text{RSTD InterFreqTDD, E-UTRAN}}$ is provided for the measurement period, and PRS are configured according to $I_{\text{PR}}$ in Tables A.9.8.28.1-1 and A.9.8.28.1-2 during this time.

The test parameters are given in Table A.9.8.28.1-1 and Table A.9.8.28.1-2.

**Table A.9.8.28.1-1: General Test Parameters for E-UTRAN TDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.14 TDD | R.14 TDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{\max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{\text{PRS}}$ | | 4 | 2 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |

| | | | | |
|---|---|---|---|---|
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1 Other neighbour cells: randomly between -3 and 3 | Cell 2: -1 Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760T_s$ and UpPTS of $4384T_s$ |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTD_InterFreqTDD,E-UTRAN}$ | ms | 15360 | 10240 | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.4.2 (for Cat-M1) and Clause 8.16.2.4.2 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.9.8.28.1-2: Cell Specific Test Parameters for E-UTRAN TDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 140 | 150 | 140 | 150 |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>MPDCCH_RA<br>MPDCCH_RB<br>OCNG_RA Note1<br>OCNG_RB Note1 | dB | 0 | 0 | 0 | 0 |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -1 | -11 | -1 | -11 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -1 | -11 | -1 | -11 |
| Io Note3 | dBm/9 MHz | -69.68 | -70.16 | -69.68 | -70.16 |
| PRP Note3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -1 | -11 | -1 | -11 |
| RSRP Note 3 | dBm/15kHz | -99 | -109 | -99 | -109 |
| Propagation condition | | AWGN | | | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). |
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS |

### A.9.8.28.2 Test Requirements

For Cat-M1 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.17.

For Cat-M2 UE in CE Mode A, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.1.

## A.9.8.29 E-UTRAN FDD-FDD RSTD inter-frequency measurement accuracy in CE Mode B

### A.9.8.29.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.18 and 9.1.25.2, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on FDD RF channel 1 and Cell 2 is on FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD\ InterFreqFDD\text{-}FDD,\ E\text{-}UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.29.1-1 and A.9.8.29.1-2 during this time.

The test parameters are given in Table A.9.8.29.1-1 and Table A.9.8.29.1-2.

**Table A.9.8.29.1-1: General Test Parameters for E-UTRAN FDD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.18 FDD | R.18 FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |

| | | | | |
|---|---|---|---|---|
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTD_InterFreqFDD-FDD,E-UTRAN}$ | ms | 40.96 | 10.24 | Derived according to the RSTD measurement requirements specified in Clause 8.13.3.7.1 (for Cat-M1) and Clause 8.16.3.2.1 (Cat-M2). |

NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth.

**Table A.9.8.29.1-2: Cell Specific Test Parameters for E-UTRAN FDD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 142 | 152 | 142 | 152 |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -11 | -14 | -11 | -14 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -11 | -14 | -11 | -14 |
| Io Note3 | dBm/9 MHz | -70.16 | -70.19 | -70.16 | -70.19 |
| PRP Note3 | dBm/15kHz | -109 | -112 | -109 | -112 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -11 | -14 | -11 | -14 |
| RSRP Note 3 | dBm/15kHz | -109 | -112 | -109 | -112 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.29.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.18.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.2.

## A.9.8.30 E-UTRAN HD-FDD RSTD inter-frequency measurement accuracy in CE Mode B

### A.9.8.30.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.18 and 9.1.25.2, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on FDD RF channel 1 and Cell 2 is on FDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-

M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD_InterFreqH_D-FDD,_E-UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.30.1-1 and A.9.8.30.1-2 during this time.

The test parameters are given in Table A.9.8.30.1-1 and Table A.9.8.30.1-2.

**Table A.9.8.30.1-1: General Test Parameters for E-UTRAN HD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.8 HD-FDD | R.8 HD-FDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |

| | | | | |
|---|---|---|---|---|
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTD\ InterFreqH\ D-FDD,\ E-UTRAN}$ | ms | 40.96 | 10.24 | Derived according to the RSTD measurement requirements specified in Clause 8.13.2.4.1 (for Cat-M1) and Clause 8.16.2.4.1 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.9.8.30.1-2: Cell Specific Test Parameters for E-UTRAN HD-FDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 142 | 152 | 142 | 152 |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -11 | -14 | -11 | -14 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -11 | -14 | -11 | -14 |
| Io Note3 | dBm/9 MHz | -70.16 | -70.19 | -70.16 | -70.19 |
| PRP Note3 | dBm/15kHz | -109 | -112 | -109 | -112 |

| | | | | | |
|---|---|---|---|---|---|
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -11 | -14 | -11 | -14 |
| RSRP Note 3 | dBm/15kHz | -109 | -112 | -109 | -112 |
| Propagation condition | | AWGN | | | |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes).

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS

### A.9.8.30.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.18.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.2.

## A.9.8.31 E-UTRAN TDD RSTD inter-frequency measurement accuracy in CE Mode B

### A.9.8.31.1 Test Purpose and Environment

The purpose of the test is to verify for Cat-M1 and Cat-M2 UE in CE Mode B that the RSTD inter-frequency measurement accuracy is within the specified limits in sections 9.1.21.18 and 9.1.25.2, respectively, in AWGN channels.

In the test, there are two synchronous cells, Cell 1 as the reference cell and Cell 2 as the neighbour cell. Cell 1 is on TDD RF channel 1 and Cell 2 is on TDD RF channel 2.

The UE requires measurement gaps to perform inter-frequency measurements. Gap pattern configuration # 0 as defined in Table 8.1.2.1-1 is provided and configured not to overlap with PRS subframes of Cell 1. Test 1 is applicable for Cat-M1 and Cat-M2 supporting 1.4 MHz UE RF bandwidth, while Test 2 is applicable for Cat-M2 supporting 5 MHz UE RF bandwidth.

The OTDOA assistance data as defined in TS 36.355, Clause 6.5.1, shall be provided to the UE before the measurement period. The last TTI containing the OTDOA assistance data shall be provided to the UE ΔT ms before the start of measurement period, where ΔT = 150 ms is the maximum processing time of the OTDOA assistance data. The measurement gap configuration is known and configured in the UE before the measurements start.

There is no PDSCH allocated in the subframe transmitting PRS. A time span of $T_{RSTD_InterFreqTDD,E-UTRAN}$ is provided for the measurement period, and PRS are configured according to $I_{PR}$ in Tables A.9.8.31.1-1 and A.9.8.31.1-2 during this time.

The test parameters are given in Table A.9.8.31.1-1 and Table A.9.8.31.1-2.

**Table A.9.8.31.1-1: General Test Parameters for E-UTRAN TDD inter-frequency RSTD Tests**

| Parameter | Unit | Value | | Comment |
|---|---|---|---|---|
| | | Test1 | Test2 | |
| MPDCCH parameters | | R.16 TDD | R.16 TDD | As specified in clause A.3.1.3.1 |
| *mPDCCH-startSF-UESS* | | 10 | 10 | Parameter *G* in $T = r_{max} \cdot G$ which determines subframe *k0* in which MPDCCH starts in the serving cell. |
| Reference cell | | Cell 1 | | |
| Neighbour cell | | Cell 2 | | |

| | | | | |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | Cell 1: 1<br>Cell 2: 2 | | The two cells are on different frequencies. |
| System Channel Bandwidth ($BW_{channel}$) | MHz | 10 | 10 | |
| PRS Bandwidth | RB | 50 Note 1 | 50 Note 1 | PRS bandwidth is as indicated in *prs-Bandwidth* in the OTDOA assistance data defined in [24]. |
| Number of consecutive positioning downlink subframes $N_{PRS}$ | | 4 | 4 | As defined in TS 36.211 |
| prs-MutingInfo | | Cell 1: '11110000'<br>Cell 2: '11110000' | | See clause 6.5.1.2 in TS 36.355 for more information |
| Cell ID | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| prs-SubframeOffset | | 10 | 10 | Number of subframes rounded to the closest integer. The corresponding parameter in the OTDOA assistance data is prs-SubframeOffset specified in TS 36.355 [24] |
| slotNumberOffset | | 0 | 0 | The slot number offset at the transmitter between a neighbour cell and the assistance data reference cell specified in TS 36.355 [24] |
| expectedRSTD | µs | Cell 2: 1<br>Other neighbour cells: randomly between -3 and 3 | Cell 2: -1<br>Other neighbour cells: randomly between -3 and 3 | |
| expectedRSTDUncertainty for all neighbour cells | µs | 5 | 5 | |
| TDD uplink-downlink configuration | | 1 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to a configuration with 5 ms switch-point periodicity and two downlink consecutive subframes |

| | | | | |
|---|---|---|---|---|
| TDD special subframe configuration | | 6 | | As specified in TS 36.211 [16], Clause 4.2; corresponds to DwPTS of $19760T_s$ and UpPTS of $4384T_s$ |
| CP length | | Normal | | |
| DRX | | OFF | | |
| Radio frame receive time offset between the cells at the UE antenna connector | µs | Cell 2 to Cell 1: -3 | Cell 2 to Cell 1: 3 | PRS are transmitted from synchronous cells |
| Number of cells provided in OTDOA assistance data | | 16 | | The number of cells includes the reference cell |
| $T_{RSTD_InterFreqTDD,E-UTRAN}$ | ms | 40.96 | 10.24 | Derived according to the RSTD measurement requirements specified in Clause 8.13.3.7.2 (for Cat-M1) and Clause 8.16.3.2.2 (Cat-M2). |
| NOTE 1: If the PRS transmission bandwidth is larger than the UE RF bandwidth, the UE is measuring RSTD within its RF bandwidth. | | | | |

**Table A.9.8.31.1-2: Cell Specific Test Parameters for E-UTRAN TDD inter-frequency RSTD Tests**

| Parameter | Unit | Test1 | | Test2 | |
|---|---|---|---|---|---|
| | | Cell1 | Cell2 | Cell1 | Cell2 |
| E-UTRA RF Channel Number | | 1 | 2 | 1 | 2 |
| Gap offset | | 9 | N/A | 9 | N/A |
| Gap pattern | | #0 | N/A | #0 | N/A |
| OCNG Patterns defined in A.3.2.1 | | OP.11 TDD | OP.2 TDD | OP.11 TDD | OP.2 TDD |
| PRS configuration Index $I_{PR}$, as defined in TS 36.211 | | 140 | 150 | 140 | 150 |
| PBCH_RA | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| MPDCCH_RA | | | | | |
| MPDCCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| PRS_RA | dB | 0 | 0 | 0 | 0 |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | -98 | -98 | -98 |
| PRS $\hat{E}_s/N_{oc}$ | dB | -11 | -14 | -11 | -14 |
| PRS $\hat{E}_s/I_{ot}$ Note3 | dB | -11 | -14 | -11 | -14 |
| Io Note3 | dBm/9 MHz | -70.16 | -70.19 | -70.16 | -70.19 |
| PRP Note3 | dBm/15kHz | -109 | -112 | -109 | -112 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -11 | -14 | -11 | -14 |
| RSRP Note 3 | dBm/15kHz | -109 | -112 | -109 | -112 |
| Propagation condition | | AWGN | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols (other than those in the PRS subframes). | | | | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | $\hat{E}_s/N_{oc}$, PRS $\hat{E}_s/I_{ot}$, Io, RSRP and PRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Io values are derived in the case that there is no PBCH, PSS or SSS in the OFDM symbols carrying PRS |

### A.9.8.31.2 Test Requirements

For Cat-M1 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.21.18.

For Cat-M2 UE in CE Mode B, the RSTD measurement accuracy shall fulfill the requirements in clause 9.1.25.2.

## A.9.8.32 TDD Intra frequency case for UE Category NB1 inband mode in normal coverage

### A.9.8.32.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement for TDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.10.

In the test there are four synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell12 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.32.1-1, A.9.8.32.1-2 and A.9.8.32.1-3.

**Table A.9.8.32.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 2 and eCell 1 | |
| NPDCCH parameters | | R.26 NB-TDD | Specified in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| NPRS muting info | | nCell 1: ‘11110000’<br>nCell 2: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration: subframePattern10-TDD | | ‘01100011’ | Correponds to subframePattern10-TDD-r15 defined in TS 36.355 [24] |
| nprsSequenceInfo | | $BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Specified in section A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |

| | | | |
|---|---|---|---|
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| Measurement period | s | 11.52 | Derived according to the RSTD measurement period in clause 4.8.1 |

**Table A.9.8.32.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | |
|---|---|---|---|
| | | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 10MHz: 30 |
| NPBCH_RA | dB | 0 | 0 |
| NPBCH_RB | | | |
| NPSS_RA | | | |
| NSSS_RA | | | |
| NPDCCH_RA | | | |
| NPDCCH_RB | | | |
| NPDSCH_RA | | | |
| NPDSCH_RB | | | |
| OCNG_RA Note 1 | | | |
| OCNG_RB Note 1 | | | |
| NPRS_RA | dB | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -6 | -13 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -6 | -13 |
| Io Note 3 | dBm/ 180kHz | -86.89 | -86.89 |
| NPRP Note 3 | dBm/ 15 kHz | -104 | -111 |
| NRSRP Note 3 | dBm/ 15 kHz | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -6 | -13 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.32.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | NOP.1 TDD | | | NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | 0 | 0 | 0 | -7 | -7 | -7 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | us | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.9.8.32.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.10.

## A.9.8.33 TDD Inter frequency case for UE Category NB1 inband mode in normal coverage

### A.9.8.33.1 Test Purpose and Environment

The purpose of the test is to verify that the inter frequency RSTD measurement for TDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.11.

In the test there are four synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell2 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.33.1-1, A.9.8.33.1-2 and A.9.8.33.1-3.

**Table A.9.8.33.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 1 and eCell 2 | |
| NPDCCH parameters | | R.26 NB-TDD | Specified in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |

| | | | |
|---|---|---|---|
| nprs-slotNumberOffset | | 0 | As defined in TS 36.355 [24] |
| nprs-SubframeOffset | | 640 | As defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| NPRS muting info | | nCell 1: '1111111100000000'<br>nCell 2: '1111111100000000' | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration: subframePattern10-TDD | | '01100011' | Correponds to subframePattern10-TDD-r15 defined in TS 36.355 [24] |
| nprsSequenceInfo nCell1 | | $BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| nprsSequenceInfo nCell2 | | $BW_{channel}$ 10MHz: 135 | Correponds to nprsSequenceInfo defined in TS36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Specified in section A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| Measurement period | s | 20.48 | Derived according to the RSTD measurement period in clause 4.8.3 |

**Table A.9.8.33.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | |
|---|---|---|---|
| | | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 10MHz: 35 |
| NPBCH_RA<br>NPBCH_RB<br>NPSS_RA<br>NSSS_RA<br>NPDCCH_RA<br>NPDCCH_RB<br>NPDSCH_RA<br>NPDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1<br>NPRS_RA | dB | 0 | 0 |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -6 | -13 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -6 | -13 |
| Io Note 3 | dBm/ 15kHz | -86.93 | -86.93 |
| NPRP Note 3 | dBm/ 15 kHz | -104 | -111 |

| | | | |
|---|---|---|---|
| NRSRP Note 3 | dBm/ 15 kHz | -104 | -111 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -6 | -13 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.33.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | NOP.1 TDD | | | NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s/N_{oc}$ Note2 | dBm | 3 | 3 | 3 | 3 | 3 | 3 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | us | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

### A.9.8.33.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.11.

## A.9.8.34 TDD Intra frequency case for UE Category NB1 inband mode in enhanced coverage

### A.9.8.34.1 Test Purpose and Environment

The purpose of the test is to verify that the intra frequency RSTD measurement for TDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.12.

In the test there are four synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell12 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been

successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.34.1-1, A.9.8.34.1-2 and A.9.8.34.1-3.

**Table A.9.8.34.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 2 and eCell 1 | |
| NPDCCH parameters | | R.26 NB-TDD | Specified in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| NPRS muting info | | nCell 1: ‘11110000’<br>nCell 2: ‘11110000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration: subframePattern-TDD | | ‘01100011’ | Correponds to subframePattern10-TDD-r15 defined in TS 36.355 [24] |
| nprsSequenceInfo | | $BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Specified in section A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |
| Measurement period | s | 11.52 | Derived according to the RSTD measurement period in clause 4.8.1 |

**Table A.9.8.34.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | |
|---|---|---|---|
| | | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 10MHz: 30 |
| NPBCH_RA | dB | 0 | 0 |
| NPBCH_RB | | | |
| NPSS_RA | | | |
| NSSS_RA | | | |
| NPDCCH_RA | | | |
| NPDCCH_RB | | | |

| | | | |
|---|---|---|---|
| NPDSCH_RA | | | |
| NPDSCH_RB | | | |
| OCNG_RA Note 1 | | | |
| OCNG_RB Note 1 | | | |
| NPRS_RA | dB | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -15 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -15 | -15 |
| Io Note 3 | dBm/ 180kHz | -87.14 | -87.14 |
| NPRP Note 3 | dBm/ 15 kHz | -113 | -113 |
| NRSRP Note 3 | dBm/ 15 kHz | -113 | -113 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -15 | -15 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.34.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | NOP.1 TDD | | | NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s/N_{oc}$ Note2 | dBm | -9 | -9 | -9 | -9 | -9 | -9 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | us | - | | | 3 | | |

Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$.

## A.9.8.34.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.12.

# A.9.8.35 TDD Inter frequency case for UE Category NB1 inband mode in enhanced coverage

## A.9.8.35.1 Test Purpose and Environment

The purpose of the test is to verify that the inter frequency RSTD measurement for TDD category NB1 UE meets the accuracy requirements specified in Clause 9.1.22.13.

In the test there are four synchronous cells: nCell 1, nCell 2, eCell1 and eCell 2. nCell 1 is the reference as well as the PCell. nCell 2, eCell1 and eCell12 are the neighbour cells.

The OTDOA assistance data and *OTDOA-RequestLocationInformation* as defined in TS 36.355 [24], shall be provided to the UE. After the receipt of the OTDOA assistance data and *OTDOA-RequestLocationInformation* has been successfully acknowledged, the UE is provided with a RRC connection release command. The UE is expected to enter RRC_IDLE before the measurement period.

The test parameters are given in Tables A.9.8.35.1-1, A.9.8.35.1-2 and A.9.8.35.1-3.

**Table A.9.8.35.1-1: General test parameters**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Inband | |
| Reference cell | | nCell 1 | |
| Neighbor cells | | nCell 2, eCell 2 and eCell 1 | |
| NPDCCH parameters | | R.26 NB-TDD | Specified in section A.3.1.6.1 |
| nprsID | | Test1: (nprsID of Cell 1 – nprsID of Cell 2)mod6=1 | As defined in TS 36.355 [24] |
| nprs-period | ms | 1280 | As defined in TS 36.355 [24] |
| nprs-startSF | | sf0 | Subframe offset of the NPRS positioning occasion as defined in TS 36.355 [24] |
| Number of consecutive downlink positioning subframes nprs-NumSF | | 640 | As defined in TS 36.355 [24] |
| NPRS muting info | | nCell 1: ‘1111111100000000’<br>nCell 2: ‘1111111100000000’ | Correponds to nprs-MutingInfoB defined in TS 36.355 [24] |
| PartA Configuration : subframePattern10 | | ‘01100011’ | Correponds to subframePattern10-r14 defined in TS 36.355 [24] |
| nprsSequenceInfo nCell1 | | $BW_{channel}$ 10MHz: 130 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| nprsSequenceInfo nCell2 | | $BW_{channel}$ 10MHz: 135 | Correponds to nprsSequenceInfo defined in TS 36.355 [24] |
| CP length | | Normal | |
| NPRACH Configuration | | NPRACH.R-2 | Specified in section A.3.18 |
| DRX cycle length | | 1.28 | The value shall be used for all cells in the test. |
| Expected RSTD | µs | nCell 2: 3<br>Other neighbour cells: randomly between -3 and 3 | The expected RSTD is what is expected at the receiver. The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD indicator |
| Expected RSTD uncertainty for all neighbour cells | µs | 5 | The corresponding parameter in the OTDOA assistance data specified in TS 36.355 [24] is the expectedRSTD-Uncertainty index |
| Number of cells provided in OTDOA assistance data | | 16 | Including the reference cell |
| Special subframe configuration | | 6 | As specified in table 4.2-1 in TS 36.211 [16] |
| Uplink-downlink configuration | | 2 | As specified in table 4.2-2 in TS 36.211 [16] |

| | | | |
|---|---|---|---|
| Measurement period | s | 20.48 | Derived according to the RSTD measurement period in clause 4.8.1 |

**Table A.9.8.35.1-2: nCell1 and nCell2 specific test parameters**

| Parameter | Unit | Test1 | |
|---|---|---|---|
| | | nCell 1 | nCell 2 |
| $BW_{channel}$ | kHz | 180 | 180 |
| PRB location within eCell | | eCell 1 $BW_{channel}$ 10MHz: 30 | eCell 2 $BW_{channel}$ 10MHz: 30 |
| NPBCH_RA | dB | 0 | 0 |
| NPBCH_RB | | | |
| NPSS_RA | | | |
| NSSS_RA | | | |
| NPDCCH_RA | | | |
| NPDCCH_RB | | | |
| NPDSCH_RA | | | |
| NPDSCH_RB | | | |
| OCNG_RA Note 1 | | | |
| OCNG_RB Note 1 | | | |
| NPRS_RA | dB | | |
| $N_{oc}$ Note 2 | dBm/ 15 kHz | -98 | -98 |
| NPRS $\hat{E}_s/N_{oc}$ | dB | -15 | -15 |
| NPRS $\hat{E}_s/I_{ot}$ Note 3 | dB | -15 | -15 |
| Io Note 3 | dBm/ 180kHz | -87.14 | -87.14 |
| NPRP Note 3 | dBm/ 15 kHz | -113 | -113 |
| NRSRP Note 3 | dBm/ 15 kHz | -113 | -113 |
| $\hat{E}_s/N_{oc}$ Note 3 | dB | -15 | -15 |
| Propagation Condition | | AWGN | AWGN |
| Antenna Configuration | | 1x1 | 1x1 |
| Timing offset to nCell 1 | us | N/A | 3 |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols other than those in the subframes with transmitted NPRS.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: If NPRS_RA is not "N/A", $\hat{E}_s/N_{oc}$, NPRS $\hat{E}_s/I_{ot}$, Io, NRSRP and NPRP levels have been derived from other parameters and are given for information purpose. If NPRS_RA is "N/A", Io and NRSRP levels have been derived from other parameters and are given for information purpose. These are not settable test parameters. Interference conditions shall be applied to all PRS symbols of DL positioning subframes.

**Table A.9.8.35.1-3: eCell 1 and eCell2 specific test parameters**

| Parameter | Unit | eCell 1 | | | eCell 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| $BW_{channel}$ | MHz | 10 | | | 10 | | |
| NOCNG Pattern | - | NOP.1 TDD | | | NOP.1 TDD | | |
| PBCH_RA | dB | -3 | | | -3 | | |
| PBCH_RB | dB | | | | | | |
| PSS_RA | dB | | | | | | |
| SSS_RA | dB | | | | | | |
| PDCCH_RA | dB | | | | | | |
| PDCCH_RB | dB | | | | | | |
| PDSCH_RA | dB | | | | | | |
| PDSCH_RB | dB | | | | | | |
| OCNG_RA Note 1 | dB | | | | | | |
| OCNG_RB Note 1 | dB | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | | | -98 | | |
| $\hat{E}_s / N_{oc}$ Note2 | dBm | -9 | -9 | -9 | -9 | -9 | -9 |
| Propagation Condition | | AWGN | | | AWGN | | |
| Antenna Configuration | | 1x1 | | | 1x1 | | |
| Timing offset to eCell 1 | us | - | | | 3 | | |
| Note 1: OCNG shall be used such that the Cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power $N_{oc}$ . | | | | | | | |

### A.9.8.35.2 Test Requirements

The RSTD measurement accuracy shall fulfill the requirements in clause 9.1.22.13.

# A.9.9 RSRP and RSRQ on the serving cell

## A.9.9.1 FDD Intra frequency serving cell case

### A.9.9.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP/ RSRQ absolute measurement accuracy is within the specified limits. This test will verify the requirements in Clause 9.1.2.1 and 9.1. 5.1 for FDD intra frequency measurements.

### A.9.9.1.2 Test parameters

In this set of test case there is only the serving cell. Absolute accuracy of RSRP/ RSRQ intra frequency measurements for the serving cell is tested by using the parameters in Table A.9.9.1.2-1. In the test case, Cell 1 is the serving cell.

**Table A.9.9.1.2-1: RSRP FDD Intra frequency test parameters**

| Parameter | | Unit | Test |
|---|---|---|---|
| | | | Cell 1 |
| E-UTRA RF Channel Number | | | 1 |
| $BW_{channel}$ | | MHz | 10 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD |
| PDSCH allocation | | $n_{PRB}$ | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | | OP.1 FDD |
| PBCH_RA | | dB | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA Note1 | | | |
| OCNG_RB Note1 | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -122 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -121.5 |

| | | | |
|---|---|---|---|
| | Bands FDD_C | | -121 |
| | Bands FDD_D | | -120.5 |
| | Bands FDD_E, FDD_F Note 5 | | -120 |
| | Bands FDD_G Note 7 | | -119 |
| | Bands FDD_H | | -118.5 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -126 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -125.5 |
| | Bands FDD_C | | -125 |
| | Bands FDD_D | | -124.5 |
| | Bands FDD_E, FDD_F Note 5 | | -124 |
| | Bands FDD_G Note 7 | | -123 |
| | Bands FDD_H | | -122.5 |
| RSRQ Note3 | Bands FDD_A Note 8 | dB | -16.25 |
| | Bands FDD_B1, FDD_B2 Note 9 | | |
| | Bands FDD_C | | |
| | Bands FDD_D | | |
| | Bands FDD_E, FDD_F Note 5 | | |
| | Bands FDD_G Note 7 | | |
| | Bands FDD_H | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -92.76 |
| | Bands FDD_B1, FDD_B2 Note 9 | | -92.26 |
| | Bands FDD_C | | -91.76 |
| | Bands FDD_D | | -91.26 |
| | Bands FDD_E, FDD_F Note 5 | | -90.76 |
| | Bands FDD_G Note 7 | | -89.76 |
| | Bands FDD_H | | -89.26 |
| $\hat{E}_s / N_{oc}$ | | dB | -4 |
| Propagation condition | | - | AWGN |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.9.9.1.3 Test Requirements

The absolute RSRP and RSRQ measurement accuracy shall fulfil the requirements in clause 9.1.2.1 and 9.1.5.1 respectively.

### A.9.9.2 TDD Intra frequency serving cell case

#### A.9.9.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP/ RSRQ absolute measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.2.1 and 9.1.5.1 for TDD intra frequency measurements.

#### A.9.9.2.2 Test parameters

In this set of test case there is only the serving cell. Absolute accuracy of RSRP/ RSRQ intra frequency measurements for the serving cell is tested by using the parameters in Table A.9.9.2.2-1. In the test case, Cell 1 is the serving cell.

**Table A.9.9.2.2-1: RSRP TDD Intra frequency test parameters**

| Parameter | | Unit | Test |
|---|---|---|---|
| | | | Cell 1 |
| E-UTRA RF Channel Number | | | 1 |
| $BW_{channel}$ | | MHz | 10 |
| Special subframe configuration[Note1] | | | 6 |
| Uplink/downlink configuration[Note1] | | | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD |
| PDSCH allocation | | $n_{PRB}$ | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) | | | OP.1 TDD |
| PBCH_RA | | dB | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note2] | | | |
| OCNG_RB[Note2] | | | |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -122 |
| | Bands TDD_C | | -121 |
| | Bands TDD_E | | -120 |
| $\hat{E}_s / I_{ot}$ | | dB | -4 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -126 |
| | Bands TDD_C | | -125 |
| | Bands TDD_E | | -124 |
| RSRQ[Note4] | Bands TDD_A | dB | -16.25 |
| | Bands TDD_C | | |
| | Bands TDD_E | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -92.76 |
| | Bands TDD_C | | -91.76 |
| | Bands TDD_E | | -90.76 |
| $\hat{E}_s / N_{oc}$ | | dB | -4 |

| Propagation condition | - | AWGN |
|---|---|---|

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

#### A.9.9.2.3 Test Requirements

The absolute RSRP and RSRQ measurement accuracy shall fulfil the requirements in section 9.1.2.1 and 9.1.5.1 respectively.

## A.9.10 SSTD

### A.9.10.1 EUTRAN FDD-FDD SSTD accuracy in asynchronous DC

#### A.9.10.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SSTD measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.20 for FDD SSTD measurements.

#### A.9.10.1.2 Test parameters

The test parameters are given in Tables A.9.10.1.2-1 and A.9.10.1.2-2. In this test there are 2 cells. Cell 1 is the PCell and cell 2 is the PScell. Cell 1 and cell 2 are on different frequencies. The SSTD time difference between PCell and PSCell reported by the UE is compared to the actual SSTD. The SSTD time difference between PCell and PSCell shall be set by the test equipment to one of the time differences in table A.9.10.1.2-3.

**Table A.9.10.1.2-1: EUTRAN FDD-FDD SSTD accuracy in asynchronous DC**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | Two radio channels are used for this test. |
| Active PCell | | Cell1 | PCell on RF channel number 1. |
| Configured PSCell | | Cell2 | PSCell on RF channel number 2. |
| CP length | | Normal | |
| DRX | | OFF | |
| Note 1: This test verifies the RRM requirement which is independent of channel bandwidth and is performed according to the principle defined in section A.3.6.1. | | | |

**Table A.9.10.1.2-2: EUTRAN FDD-FDD SSTD accuracy in asynchronous DC**

| Parameter | Unit | Cell 1 | Cell 2 |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 | 5MHz: $N_{RB,c}$ = 25<br>10MHz: $N_{RB,c}$ = 50<br>20MHz: $N_{RB,c}$ = 100 |
| PDSCH parameters: DL Reference Measurement Channel | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD |

| | | | |
|---|---|---|---|
| PCFICH/PDCCH/PHICH parameters:<br>DL Reference Measurement Channel | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD |
| OCNG Patterns | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| PCFICH_RB | dB | | |
| PHICH_RA | dB | | |
| PHICH_PB | dB | | |
| PDCCH_RA | dB | | |
| PDCCH_PB | dB | | |
| PDSCH_RA | dB | | |
| PDSCH_RB | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ Note 2 | dBm/15 KHz | -104 | -104 |
| $\hat{E}_s / N_{oc}$ | dB | -3 | -3 |
| $\hat{E}_s / I_{ot}$ | dB | -3 | -3 |
| RSRP Note 3 | dBm/15 KHz | -107 | -107 |
| SCH_RP Note 3 | dBm/15 KHz | -107 | -107 |
| Io Note 3 | dBm/Ch BW | -74.45 +10log ($N_{RB,c}$ /50) | -74.45 +10log ($N_{RB,c}$ /50) |
| Propagation Condition | | AWGN | AWGN |
| Correlation Matrix and Antenna Configuration | | 1x2 Low | 1x2 Low |
| Receive Time offset to cell1 Note 4 | µs | - | Between 22.8 and 42.9 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
Note 3: RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: Offset shall be chosen by the test equipment. Test equipment may also select any SFN and frame offset between cell 1 and cell 2

**Table A.9.10.1.2-3: EUTRAN FDD-FDD SSTD accuracy in asynchronous DC timing offsets**

| Configuration | SFN offset between MeNB and SeNB (ΔX) | Frame boundary offset between MeNB and SeNB (ΔY) | Subframe boundary offset between MeNB and SeNB (ΔZ). |
|---|---|---|---|
| 1 | 100 | -4 | 800 |
| 2 | 300 | -2 | 900 |
| 3 | 500 | 0 | 1000 |
| 4 | 700 | 3 | 1100 |
| 5 | 900 | 5 | 1200 |

### A.9.10.1.3 Test Requirements

The SSTD reported by the UE consists of 3 elements, SFN offset between MeNB and SeNB (ΔX), frame boundary offset between MeNB and SeNB (ΔY) and subframe boundary offset between MeNB and SeNB (ΔZ).

The reported ΔX, ΔY and ΔZ shall meet the accuracy requirements in section 9.1.20.

## A.9.10.2 Void

## A.9.10.3 Void

## A.9.10.4 Void

# A.9.11 RSSI

## A.9.11.1 FS3 average RSSI accuracy case (PCell using FDD)

### A.9.11.1.1 Test Purpose and Environment

The purpose of this test is to verify that the average RSSI measurement accuracy is within the specified limits. This test will partially verify the requirements in Section 9.1.18.5.2.

### A.9.11.1.2 Test parameters

In all test cases, Cell 1 is the PCell and Cell 2 the FS3 Scell. RSSI is measured on channel number 2.

**Table A.9.11.1.2-1: Average RSSI test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5<br>10<br>20 | 20 |
| Listen before talk model | | Not applicable | Not used |
| Measurement bandwidth | $n_{PRB}$ | 6 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | R0.FS3 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | R0.FS3 |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | OP.14 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | dB | 0 | 0 |
| $N_{oc}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -106 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -83 |

| | | | |
|---|---|---|---|
| $\hat{E}_s/I_{ot}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | 2.5 |
| $\hat{E}_s/I_{ot}$ in subframes corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | -Infinity |
| RSRP in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -103.5 | -103.5 |
| RSRP in subframes corresponding to RSSI measurement time configuration (RMTC) | | -103.5 | -Infinity |
| Io within measurement bandwidth in subframes corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -64.43 |
| Io within measurement bandwidth in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -83 |
| Propagation condition | - | AWGN | |

**Table A.9.11.1.2-2: Average RSSI RMTC and DMTC parameters**

| | |
|---|---|
| measDuration-r13 | sym14 |
| rmtc-Period-r13 | ms40 |
| rmtc-SubframeOffset-r13 | 20 |
| ReportInterval | ms120 |
| dmtc-PeriodOffset-r12 | ms40-r12 value 0 |

### A.9.11.1.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 9.1.18.5.2. The nominal RSSI used to evaluate the requirement shall be based on Io in subframes corresponding to RSSI measurement time configuration (RMTC).

## A.9.11.2 FS3 average RSSI accuracy case (PCell using TDD)

### A.9.11.2.1 Test Purpose and Environment

The purpose of this test is to verify that the average RSSI measurement accuracy is within the specified limits. This test will partially verify the requirements in Section 9.1.18.5.2.

### A.9.11.2.2 Test parameters

In all test cases, Cell 1 is the PCell and Cell 2 the FS3 Scell. RSSI is measured on channel number 2.

**Table A.9.11.2.2-1: Average RSSI test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5<br>10<br>20 | 20 |
| Listen before talk model | | Not applicable | Not used |
| Measurement bandwidth | $\eta_{PRB}$ | 6 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | R0.FS3 |

| | | | |
|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | R0.FS3 |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | OP.14 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note1] | | | |
| OCNG_RB[Note1] | | | |
| $N_{oc}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -106 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -83 |
| $\hat{E}_s / I_{ot}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | 2.5 |
| $\hat{E}_s / I_{ot}$ in subframes corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | -Infinity |
| RSRP in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -103.5 | -103.5 |
| RSRP in subframes corresponding to RSSI measurement time configuration (RMTC) | | -103.5 | -Infinity |
| Io within measurement bandwidth in subframes corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -64.43 |
| Io within measurement bandwidth in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -83 |
| Propagation condition | - | AWGN | |

**Table A.9.11.2.2-2: Average RSSI RMTC and DMTC parameters**

| | |
|---|---|
| measDuration-r13 | sym14 |
| rmtc-Period-r13 | ms40 |
| rmtc-SubframeOffset-r13 | 20 |
| ReportInterval | ms120 |
| dmtc-PeriodOffset-r12 | ms40-r12 value 0 |

#### A.9.11.2.3 Test Requirements

The average RSSI measurement accuracy shall fulfil the requirements in sections 9.1.18.5.2. The nominal RSSI used to evaluate the requirement shall be based on Io in subframes corresponding to RSSI measurement time configuration (RMTC).

# A.9.12 Channel occupancy

## A.9.12.1 FS3 channel occupancy test (PCell using FDD)

### A.9.12.1.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy is within the specified limits. This test will partially verify the requirements in Section 9.1.18.6.1.

### A.9.12.1.2 Test parameters

In all test cases, Cell 1 is the PCell and Cell 2 the FS3 Scell. Channel occupancy is measured on channel number 2.

**Table A.9.12.1.2-1: Channel occupancy test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5<br>10<br>20 | 20 |
| Listen before talk model | | Not applicable | Not used |
| Measurement bandwidth | $n_{PRB}$ | 6 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.5 FDD<br>10MHz: R.0 FDD<br>20MHz: R.4 FDD | R0.FS3 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 FDD<br>10MHz: R.6 FDD<br>20MHz: R.10 FDD | R0.FS3 |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.15 FDD<br>10MHz: OP.1 FDD<br>20MHz: OP.11 FDD | OP.14 FDD |
| PBCH_RA | dB | 0 | 0 |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note1] | | | |
| OCNG_RB[Note1] | | | |
| $N_{oc}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -106 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 = 2 (Note 1) | dBm/15 kHz | -106 | -90.28 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time | dBm/15 kHz | -106 | -97.28 |

| | | | |
|---|---|---|---|
| configuration (RMTC) where system frame number mod 12 is not equal to 2 (Note 1) | | | |
| $\hat{E}_s/I_{ot}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | 2.5 |
| $\hat{E}_s/I_{ot}$ in subframes corresponding to RSSI measurement time configuration (RMTC) | dB | 2.5 | -Infinity |
| RSRP in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -103.5 | -103.5 |
| RSRP in subframes corresponding to RSSI measurement time configuration (RMTC) | | -103.5 | -Infinity |
| Io within measurement bandwidth in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 = 2 (Note 1) | dBm/1.08 MHz | -83 | -71.73 |
| Io within measurement bandwidth in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 is not equal to 2 (Note 1) | dBm/1.08 MHz | -83 | -78.73 |
| Io within measurement bandwidth in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -83 |
| Propagation condition | - | AWGN | |
| channelOccupancyThreshold | dBm | -75.2 | |
| Note 1: Accumulated system frame number is used to avoid a configuration not matching the test purpose at the boundary of hyper frame numbers. | | | |

**Table A.9.12.1.2-2: Channel occupancy RMTC and DMTC parameters**

| | |
|---|---|
| measDuration-r13 | sym14 |
| rmtc-Period-r13 | ms40 |
| rmtc-SubframeOffset-r13 | 20 |
| ReportInterval | ms120 |
| dmtc-PeriodOffset-r12 | ms40-r12 value 0 |

### A.9.12.1.3 Test Requirements

The nominal reported *channelOccupancy* shall be 33. At least 90% of channel occupancy reports made by the UE shall indicate this value.

## A.9.12.2 FS3 channel occupancy test (PCell using TDD)

### A.9.12.2.1 Test Purpose and Environment

The purpose of this test is to verify that the channel occupancy is within the specified limits. This test will partially verify the requirements in Section 9.1.18.6.1.

### A.9.12.2.2 Test parameters

In all test cases, Cell 1 is the PCell and Cell 2 the FS3 Scell. Channel occupancy is measured on channel number 2.

**Table A.9.12.2.2-1: Channel occupancy test parameters**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | 2 |
| $BW_{channel}$ | MHz | 5<br>10<br>20 | 20 |
| Listen before talk model | | Not applicable | Not used |
| Measurement bandwidth | $n_{PRB}$ | 6 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | 5MHz: R.4 TDD<br>10MHz: R.0 TDD<br>20MHz: R.3 TDD | R0.FS3 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | 5MHz: R.11 TDD<br>10MHz: R.6 TDD<br>20MHz: R.10 TDD | R0.FS3 |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | 5MHz: OP.9 TDD<br>10MHz: OP.1 TDD<br>20MHz: OP.7 TDD | OP.14 FDD |
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA[Note1]<br>OCNG_RB[Note1] | dB | 0 | 0 |
| $N_{oc}$ in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -106 | -106 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 = 2 (Note 1) | dBm/15 kHz | -106 | -90.28 |
| $N_{oc}$ in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 is not equal to 2 (Note 1) | dBm/15 kHz | -106 | -97.28 |
| $\hat{E}_s / I_{ot}$ in subframes not corresponding to RSSI measurement time configuration (RMT) | dB | 2.5 | 2.5 |
| $\hat{E}_s / I_{ot}$ in subframes corresponding to RSSI measurement time configuration (RMTC | dB | 2.5 | -Infinity |
| RSRP in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/15 kHz | -103.5 | -103.5 |
| RSRP in subframes corresponding to RSSI measurement time configuration (RMTC) | | -103.5 | -Infinity |
| Io within measurement bandwidth in subframes corresponding to RSSI | dBm/1.08 MHz | -83 | -71.73 |

| | | | |
|---|---|---|---|
| measurement time configuration (RMTC) where system frame number mod 12 = 2 (Note 1) | | | |
| Io within measurement bandwidth in subframes corresponding to RSSI measurement time configuration (RMTC) where system frame number mod 12 is not equal to 2 (Note 1) | dBm/1.08 MHz | -83 | -78.73 |
| Io within measurement bandwidth in subframes not corresponding to RSSI measurement time configuration (RMTC) | dBm/1.08 MHz | -83 | -83 |
| Propagation condition | - | AWGN | |
| channelOccupancyThreshold | dBm | -75.2 | |
| Note 1: Accumulated system frame number is used to avoid a configuration not matching the test purpose at the boundary of hyper frame numbers. | | | |

**Table A.9.12.2.2-2: Channel occupancy RMTC and DMTC parameters**

| | |
|---|---|
| measDuration-r13 | sym14 |
| rmtc-Period-r13 | ms40 |
| rmtc-SubframeOffset-r13 | 20 |
| ReportInterval | ms120 |
| dmtc-PeriodOffset-r12 | ms40-r12 value 0 |

### A.9.12.2.3 Test Requirements

The nominal reported *channelOccupancy* in this test is 33. At least 90% of channel occupancy reports made by the UE shall indicate this value.

# A.9.13 RS-SINR

## A.9.13.1 FDD Intra-Frequency Case

### A.9.13.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.17.2.1.

### A.9.13.1.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RS-SINR intra-frequency measurement is tested by using the parameters in Table A.9.13.1.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.13.1.2-1: RS-SINR FDD intra-frequency test parameters**

| Parameter | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|
| | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | 1 | | 1 | |
| Cell Ids | | (Cell ID of cell 1 – Cell ID of cell 2) mod 3 ≠ 0 | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| $BW_{channel}$ | MHz | 10 | | 10 | |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.0 FDD | - | R.0 FDD | - |
| PDSCH allocation | $n_{PRB}$ | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | - | R.6 FDD | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and A.3.2.1.2 (OP.2 FDD) | | | OP.1 FDD | - | OP.1 FDD | - |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | 0 | | 0 |
| PSS_RA | | | | 0 | | 0 |
| SSS_RA | | | | 0 | | 0 |
| PCFICH_RB | | | | -∞ | | -∞ |
| PHICH_RA | | | | -∞ | | -∞ |
| PHICH_RB | | | | -∞ | | -∞ |
| PDCCH_RA | | | | -∞ | | -∞ |
| PDCCH_RB | | | | -∞ | | -∞ |
| PDSCH_RA | | | | -∞ | | -∞ |
| PDSCH_RB | | | | -∞ | | -∞ |
| OCNG_RA Note1 | | | | -∞ | | -∞ |
| OCNG_RB Note1 | | | | -∞ | | -∞ |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -90 | -90 | -116 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -115.5 | |
| | Bands FDD_C | | | | -115 | |
| | Bands FDD_D | | | | -114.5 | |
| | Bands FDD_E, FDD_F Note 5 | | | | -114 | |
| | Bands FDD_G Note 7 | | | | -113 | |
| | Bands FDD_H | | | | -112.5 | |
| CRS $\hat{E}_s / I_{ot}$ | | dB | 5 | -3.19 | -5.46 | -5.46 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -85.00 | -87.00 | -120 | -120 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -119.5 | -119.5 |
| | Bands FDD_C | | | | -119 | -119 |
| | Bands FDD_D | | | | -118.5 | -118.5 |
| | Bands FDD_E, FDD_F Note 5 | | | | -118 | -118 |
| | Bands FDD_G Note 7 | | | | -117 | -117 |
| | Bands FDD_H | | | | -116.5 | -116.5 |
| RS-SINR Note3 | Bands FDD_A Note 8 | dB | 5 | -3.19 | -5.46 | -5.46 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | | |
| | Bands FDD_C | | | | | |
| | Bands FDD_D | | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | | |
| | Bands FDD_G Note 7 | | | | | |
| | Bands FDD_H | | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -55.69 | -55.69 | -86.56 | |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -86.06 | |
| | Bands FDD_C | | | | -85.56 | |
| | Bands FDD_D | | | | -85.06 | |
| | Bands FDD_E, FDD_F Note 5 | | | | -84.56 | |
| | Bands FDD_G Note 7 | | | | -83.56 | |
| | Bands FDD_H | | | | -83.06 | |
| CRS $\hat{E}_s / N_{oc}$ | | dB | 5 | 3 | -4 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | | | | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 4: | RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 5: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 7: | Except Band 29 |
| Note 8: | Except Band 32, Band 75, Band 76. |
| Note 9: | For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. |

#### A.9.13.1.3 Test Requirements

The RS-SINR measurement accuracy for Cell 2 shall fulfil the requirements in Section 9.1.17.2.1.

### A.9.13.2 TDD Intra-Frequency Case

#### A.9.13.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Section 9.1.17.2.1.

#### A.9.13.2.2 Test parameters

In this test case all cells are on the same carrier frequency. The absolute accuracy of RS-SINR intra-frequency measurement is tested by using the parameters in Table A.9.13.2.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.13.2.2-1: RS-SINR TDD intra-frequency test parameters**

| Parameter | | Unit | Test 1 | | Test 2 | |
|---|---|---|---|---|---|---|
| | | | Cell 1 | Cell 2 | Cell 1 | Cell 2 |
| E-UTRA RF Channel Number | | | 1 | | 1 | |
| Cell Ids | | | (Cell ID of cell 1 – Cell ID of cell 2) mod 3 ≠ 0 | | (Cell ID of cell 1 – Cell ID of cell 2) mod 6 = 0 | |
| $BW_{channel}$ | | MHz | 10 | | 10 | |
| Special subframe configuration[Note1] | | | 6 | | 6 | |
| Uplink-downlink configuration[Note1] | | | 1 | | 1 | |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | | 22—27 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | - | R.0 TDD | - |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | - | 13—36 | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | - | R.6 TDD | - |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and A.3.2.2.2 (OP.2 TDD) | | | OP.1 TDD | - | OP.1 TDD | - |
| PBCH_RA | | dB | 0 | 0 | 0 | 0 |
| PBCH_RB | | | | 0 | | 0 |
| PSS_RA | | | | 0 | | 0 |
| SSS_RA | | | | 0 | | 0 |
| PCFICH_RB | | | | -∞ | | -∞ |
| PHICH_RA | | | | -∞ | | -∞ |
| PHICH_RB | | | | -∞ | | -∞ |
| PDCCH_RA | | | | -∞ | | -∞ |
| PDCCH_RB | | | | -∞ | | -∞ |
| PDSCH_RA | | | | -∞ | | -∞ |
| PDSCH_RB | | | | -∞ | | -∞ |
| OCNG_RA[Note2] | | | | -∞ | | -∞ |
| OCNG_RB[Note2] | | | | -∞ | | -∞ |
| $N_{oc}$ [Note3] | Bands TDD_A | dBm/15 kHz | -90.00 | -90.00 | -116 | |
| | Bands TDD_C | | | | -115 | |
| | Bands TDD_E | | | | -114 | |
| $\hat{E}_s / I_{ot}$ | | dB | 5 | -3.19 | -5.46 | -5.46 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -85 | -87 | -120 | -120 |
| | Bands TDD_C | | | | -119 | -119 |
| | Bands TDD_E | | | | -118 | -118 |
| RS-SINR[Note4] | Bands TDD_A, TDD_C, TDD_E | dB | 5 | -3.19 | -5.46 | -5.46 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -55.69 | -55.69 | -86.56 | |
| | Bands TDD_C | | | | -85.56 | |
| | Bands TDD_E | | | | -84.56 | |
| $\hat{E}_s / N_{oc}$ | | dB | 5 | 3 | -4 | -4 |
| Propagation condition | | - | AWGN | | AWGN | |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

| | |
|---|---|
| Note 4: | RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |
| Note 5: | RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |

### A.9.13.2.3 Test Requirements

The RS-SINR measurement accuracy for Cell 2 shall fulfil the requirements in Section 9.1.17.2.1.

## A.9.13.3 FDD—FDD Inter frequency case

### A.9.13.3.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.17.3.

### A.9.13.3.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RS-SINR inter-frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.13.3.2-1 and Table A.9.13.3.2-2. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.13.3.2-1: RS-SINR FDD—FDD Inter frequency test parameters (Cell 1)**

| Parameter | | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | | 2 | 2 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | 0 | 0 |
| Measurement bandwidth | | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | R.0 FDD |
| PDSCH allocation | | | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 | | | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -80 | -108.50 | -119.5 |
| | Bands FDD_B | | | | -119 |
| | Bands FDD_C | | | | -118.5 |
| | Bands FDD_D | | | | -118 |
| | Bands FDD_E, FDD_F Note 5 | | | | -117.5 |
| | Bands FDD_G Note 7 | | | | -116.5 |
| | Bands FDD_H | | | | -116 |
| CRS | | dB | -1.75 | 20 | -4.0 |

| | | | | | |
|---|---|---|---|---|---|
| RSRP[Note3] | Bands FDD_A Note 8 | dBm/15 kHz | -81.75 | -88.50 | -123.5 |
| | Bands FDD_B | | | | -123 |
| | Bands FDD_C | | | | -122.5 |
| | Bands FDD_D | | | | -122 |
| | Bands FDD_E, FDD_F Note 5 | | | | -121.5 |
| | Bands FDD_G Note 7 | | | | -120.5 |
| | Bands FDD_H | | | | -120 |
| RS-SINR[Note3] | Bands FDD_A Note 8 | dB | -1.75 | 20 | -4.0 |
| | Bands FDD_B | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | |
| | Bands FDD_G Note 7 | | | | |
| | Bands FDD_H | | | | |
| Io[Note3] | Bands FDD_A Note 8 | dBm/9 MHz | -50 | -60.68 | -90.26 |
| | Bands FDD_B | | | | -89.76 |
| | Bands FDD_C | | | | -89.26 |
| | Bands FDD_D | | | | -88.76 |
| | Bands FDD_E, FDD_F Note 5 | | | | -88.26 |
| | Bands FDD_G Note 7 | | | | -87.26 |
| | Bands FDD_H | | | | -86.76 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 3: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32.

**Table A.9.13.3.2-2: RS-SINR FDD—FDD Inter frequency test parameters (Cell 2)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 1 | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | - | - | - |
| Measurement bandwidth | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | - | - | - |
| PDSCH allocation | | - | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |

| | | | | | |
|---|---|---|---|---|---|
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -85 | -108.5 | -119.5 |
| | Bands FDD_B | | | | -119 |
| | Bands FDD_C | | | | -118.5 |
| | Bands FDD_D | | | | -118 |
| | Bands FDD_E, FDD_F Note 5 | | | | -117.5 |
| | Bands FDD_G Note 7 | | | | -116.5 |
| | Bands FDD_H | | | | -116 |
| Note2a | Bands FDD_A Note 8 | dBm/15 kHz | -79 | -114.5 | -113.5 |
| | Bands FDD_B | | | | -113 |
| | Bands FDD_C | | | | -112.5 |
| | Bands FDD_D | | | | -112 |
| | Bands FDD_E, FDD_F Note 5 | | | | -111.5 |
| | Bands FDD_G Note 7 | | | | -110.5 |
| | Bands FDD_H | | | | -110 |
| CRS | | dB | -1.75 | 20 | -4.0 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -86.75 | -88.50 | -123.5 |
| | Bands FDD_B | | | | -123 |
| | Bands FDD_C | | | | -122.5 |
| | Bands FDD_D | | | | -122 |
| | Bands FDD_E, FDD_F Note 5 | | | | -121.5 |
| | Bands FDD_G Note 7 | | | | -120.5 |
| | Bands FDD_H | | | | -120 |
| RS-SINR Note3 | | dB | -1.75 | 20 | -4.0 |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50.68 | -60.71 | -85.45 |
| | Bands FDD_B | | | | -84.95 |
| | Bands FDD_C | | | | -84.45 |
| | Bands FDD_D | | | | -83.95 |
| | Bands FDD_E, FDD_F Note 5 | | | | -83.45 |
| | Bands FDD_G Note 7 | | | | -82.45 |
| | Bands FDD_H | | | | -81.95 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 2a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 3: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

| | |
|---|---|
| Note 5: | For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz. |
| Note 6: | E-UTRA operating band groups are as defined in Section 3.5. |
| Note 7: | Except Band 29. |
| Note 8: | Except Band 32. |

#### A.9.13.3.3 Test Requirements

The RS-SINR measurement accuracy shall fulfil the requirements in Sections 9.1.17.3.

### A.9.13.4 TDD—TDD Inter frequency case

#### A.9.13.4.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.17.3.

#### A.9.13.4.2 Test parameters

In this test case the two cells are on different carrier frequencies and measurement gaps are provided. Both RS-SINR inter-frequency absolute and relative accuracy requirements are tested by using test parameters in Table A.9.13.4.2-1 and Table A.9.13.4.2-2 for TDD configuration 1 and in Table A.9.13.4.2-3 and Table A.9.13.4.2-4 for TDD configuration 0. In all tests, Cell 1 is the PCell and Cell 2 the target cell.

**Table A.9.13.4.2-1: RS-SINR TDD—TDD Inter frequency test parameters for TDD configuration 1 (Cell 1)**

| Parameter | | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|---|
| | | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | | 2 | 2 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | 0 | 0 |
| Special subframe configuration Note1 | | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | | 1 | 1 | 1 |
| Measurement bandwidth | | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | R.0 TDD | R.0 TDD |
| PDSCH allocation | | | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 | | | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| Note3 | Bands TDD_A | dBm/15 kHz | -80 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| CRS | | dB | -1.75 | 20 | -4.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR Note4 | | dB | -1.75 | 20 | -4.0 |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -50 | -60.68 | -90.26 |
| | Bands TDD_C | | | | -89.26 |
| | Bands TDD_E | | | | -88.26 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.13.4.2-2: RS-SINR TDD—TDD Inter frequency test parameters for TDD configuration 1 (Cell 2)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| Special subframe configuration Note1 | | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | | 1 | 1 | 1 |
| Measurement bandwidth | | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | - | - | - |
| PDSCH allocation | | | - | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.2 | | | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| Note3 | Bands TDD_A | dBm/15 kHz | -85 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| Note3a | Bands TDD_A | dBm/15 kHz | -79 | -114.50 | -113.50 |
| | Bands TDD_C | | | | -112.50 |
| | Bands TDD_E | | | | -111.50 |
| CRS | | dB | -1.75 | 20 | -4.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR Note4 | | dB | -1.75 | 20 | -4.0 |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -50.68 | -60.71 | -85.45 |
| | Bands TDD_C | | | | -84.45 |
| | Bands TDD_E | | | | -83.45 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for CRS to be fulfilled.
Note 3a: Interference from other cells and noise sources not specified in the test is assumed to be constant over Non-CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Non-CRS to be fulfilled.
Note 4: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.13.4.2-3: RS-SINR TDD—TDD Inter frequency test parameters for TDD configuration 0 (Cell 1)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Special subframe configuration Note1 | | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | | 0 | 0 | 0 |
| Measurement bandwidth | | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | | R.0 TDD | R.0 TDD | R.0 TDD |
| PDSCH allocation | | | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.1 | | | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| Note3 | Bands TDD_A | dBm/15 kHz | -80 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| CRS | | dB | -1.75 | 20 | -4.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR Note4 | | dB | -1.75 | 20 | -4.0 |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -50 | -60.68 | -90.26 |
| | Bands TDD_C | | | | -89.26 |
| | Bands TDD_E | | | | -88.26 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.13.4.2-4: RS-SINR TDD—TDD Inter frequency test parameters for TDD configuration 0 (Cell 2)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | - | - | - |
| Special subframe configuration Note1 | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | 0 | 0 | 0 |
| Measurement bandwidth | | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | - | - | - |
| PDSCH allocation | | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.2 | | | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| CRS [Note3] | Bands TDD_A | dBm/15 kHz | -85 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| Non-CRS [Note3a] | Bands TDD_A | dBm/15 kHz | -79 | -114.50 | -113.50 |
| | Bands TDD_C | | | | -112.50 |
| | Bands TDD_E | | | | -111.50 |
| CRS | | dB | -1.75 | 20 | -4.0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR[Note4] | | dB | -1.75 | 20 | -4.0 |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -50.68 | -60.71 | -85.45 |
| | Bands TDD_C | | | | -84.45 |
| | Bands TDD_E | | | | -83.45 |
| Propagation condition | | - | AWGN | AWGN | AWGN |
| Antenna Configuration | | - | 1x2 | 1x2 | 1x2 |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 3a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.
Note 4: RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.13.4.3 Test Requirements

The RS-SINR measurement accuracy shall fulfil the requirements in Sections 9.1.17.3.

## A.9.13.5 FDD—TDD Inter frequency case

### A.9.13.5.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.17.3.

### A.9.13.5.2 Test parameters

In this set of test cases the two cells are on different carrier frequencies. Both absolute and relative accuracy of RS-SINR inter frequency measurements are tested by using the parameters in Table A.9.13.5.2-1. In all test cases, Cell 1 is

the PCell and Cell 2 is the target cell. Cell 1 is FDD cell and Cell 2 is TDD cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.13.5.2-1: RS-SINR FDD—TDD Inter frequency test parameters (FDD Cell1)**

| Parameter | | Unit | Test 1 | Test 2 | Test 2 |
|---|---|---|---|---|---|
| | | | Cell 1 | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | | 2 | 2 | 2 |
| $BW_{channel}$ | | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | | 0 | 0 | 0 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | R.0 FDD |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -80 | -108.50 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -119 |
| | Bands FDD_C | | | | -118.5 |
| | Bands FDD_D | | | | -118 |
| | Bands FDD_E, FDD_F Note 5 | | | | -117.5 |
| | Bands FDD_G Note 7 | | | | -116.5 |
| | Bands FDD_H | | | | -116 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | -1.75 | 20 | -4.0 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -81.75 | -88.50 | -123.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -123 |
| | Bands FDD_C | | | | -122.5 |
| | Bands FDD_D | | | | -122 |
| | Bands FDD_E, FDD_F Note 5 | | | | -121.5 |
| | Bands FDD_G Note 7 | | | | -120.5 |
| | Bands FDD_H | | | | -120 |
| RS-SINR Note3 | Bands FDD_A Note 8 | dB | -1.75 | 20 | -4.0 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_E, FDD_F Note 5 | | | | |
| | Bands FDD_G Note 7 | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50 | -60.68 | -90.26 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -89.76 |
| | Bands FDD_C | | | | -89.26 |
| | Bands FDD_D | | | | -88.76 |
| | Bands FDD_E, FDD_F Note 5 | | | | -88.26 |
| | Bands FDD_G Note 7 | | | | -87.26 |
| | Bands FDD_H | | | | -86.76 |
| CRS $\hat{E}_s / N_{oc}$ | | dB | -1.75 | 20 | -4.0 |
| Propagation condition | | - | | AWGN | AWGN |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.
Note 7: Except Band 29.
Note 8: Except Band 32, Band 75, Band 76.
Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

**Table A.9.13.5.2-2: RS-SINR FDD—TDD Inter frequency test parameters (TDD cell2)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | - | - | - |
| Special subframe configuration Note1 | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | 1 | 1 | 1 |
| Measurement bandwidth | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | - | - | - |
| PDSCH allocation | $n_{PRB}$ | - | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | dB | 0 | 0 | 0 |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |

| | | | | | |
|---|---|---|---|---|---|
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA[Note2] | | | | | |
| OCNG_RB[Note2] | | | | | |
| $N_{oc1}$ [Note3] | Bands TDD_A | dBm/15 kHz | -85 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| $N_{oc2}$ [Note3a] | Bands TDD_A | dBm/15 kHz | -79 | -114.50 | -113.50 |
| | Bands TDD_C | | | | -112.50 |
| | Bands TDD_E | | | | -111.50 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | -1.75 | 20 | -4.0 |
| RSRP[Note4] | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR[Note4] | Bands TDD_A | dB | -1.75 | 20 | -4.0 |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| Io[Note4] | Bands TDD_A | dBm/9 MHz | -50.79 | -60.56 | -93.48 |
| | Bands TDD_C | | | | -92.48 |
| | Bands TDD_E | | | | -91.48 |
| CRS $\hat{E}_s / N_{oc}$ | | dB | -1.75 | 20 | -4.0 |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc1}$ to be fulfilled.
Note 3a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc2}$ to be fulfilled.
Note 4: RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

### A.9.13.5.3 Test Requirements

The RS-SINR measurement accuracy shall fulfil the requirements in Sections 9.1.17.3.

## A.9.13.6 TDD—FDD Inter frequency case

### A.9.13.6.1 Test Purpose and Environment

The purpose of this test is to verify that the RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.17.3.

### A.9.13.6.2 Test parameters

In this set of test cases the two cells are on different carrier frequencies. Both absolute and relative accuracy of RS-SINR inter frequency measurements are tested by using the parameters in Table A.9.13.6.2-1. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell. Cell 1 is TDD cell and Cell 2 is FDD cell. The inter frequency measurements are supported by a measurement gap.

**Table A.9.13.6.2-1: RS-SINR TDD—FDD Inter frequency test parameters (TDD cell1)**

| Parameter | Unit | Test 1 | Test 2 | Test 3 |
|---|---|---|---|---|
| | | Cell 2 | Cell 2 | Cell 2 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| $BW_{channel}$ | | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | | - | - | - |
| Special subframe configuration Note1 | | | 6 | 6 | 6 |
| Uplink-downlink configuration Note1 | | | 1 | 1 | 1 |
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel | | | - | - | - |
| PDSCH allocation | | $n_{PRB}$ | - | - | - |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | | | R.6 TDD | R.6 TDD | R.6 TDD |
| OCNG Patterns defined in A.3.2.2.2 (OP.2 TDD) | | | OP.2 TDD | OP.2 TDD | OP.2 TDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note2 | | | | | |
| OCNG_RB Note2 | | | | | |
| $N_{oc}$ Note3 | Bands TDD_A | dBm/15 kHz | -80 | -108.50 | -119.50 |
| | Bands TDD_C | | | | -118.50 |
| | Bands TDD_E | | | | -117.50 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | -1.75 | 20 | -4.0 |
| RSRP Note4 | Bands TDD_A | dBm/15 kHz | -81.75 | -88.50 | -123.50 |
| | Bands TDD_C | | | | -122.50 |
| | Bands TDD_E | | | | -121.50 |
| RS-SINR Note4 | Bands TDD_A | dB | -1.75 | 20 | -4.0 |
| | Bands TDD_C | | | | |
| | Bands TDD_E | | | | |
| Io Note4 | Bands TDD_A | dBm/9 MHz | -50 | -60.68 | -90.26 |
| | Bands TDD_C | | | | -89.26 |
| | Bands TDD_E | | | | -88.26 |
| CRS $\hat{E}_s / N_{oc}$ | | dB | -1.75 | 20 | -4.0 |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.
Note 2: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 6: E-UTRA operating band groups are as defined in Section 3.5.

**Table A.9.13.6.2-2: RS-SINR TDD—FDD Inter frequency test parameters (FDD Cell2)**

| Parameter | Unit | Test 1 | Test 2 | Test 2 |
|---|---|---|---|---|
| | | Cell 1 | Cell 1 | Cell 1 |
| E-UTRA RF Channel Number | | 2 | 2 | 2 |
| $BW_{channel}$ | MHz | 10 | 10 | 10 |
| Gap Pattern Id | | 0 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Measurement bandwidth | | $n_{PRB}$ | 22—27 | 22—27 | 22—27 |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | | R.0 FDD | R.0 FDD | R.0 FDD |
| PDSCH allocation | | $n_{PRB}$ | 13—36 | 13—36 | 13—36 |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | | R.6 FDD | R.6 FDD | R.6 FDD |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) | | | OP.1 FDD | OP.1 FDD | OP.1 FDD |
| PBCH_RA | | dB | 0 | 0 | 0 |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note1 | | | | | |
| OCNG_RB Note1 | | | | | |
| $N_{oc1}$ Note2 | Bands FDD_A Note 8 | dBm/15 kHz | -85 | -108.5 | -119.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -119 |
| | Bands FDD_C | | | | -118.5 |
| | Bands FDD_D | | | | -118 |
| | Bands FDD_E, FDD_F Note 5 | | | | -117.5 |
| | Bands FDD_G Note 7 | | | | -116.5 |
| | Bands FDD_H | | | | -116 |
| $N_{oc2}$ Note2a | Bands FDD_A Note 8 | dBm/15 kHz | -79 | -114.5 | -113.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -113 |
| | Bands FDD_C | | | | -112.5 |
| | Bands FDD_D | | | | -112 |
| | Bands FDD_E, FDD_F Note 5 | | | | -111.5 |
| | Bands FDD_G Note 7 | | | | -110.5 |
| | Bands FDD_H | | | | -110 |
| CRS $\hat{E}_s / I_{ot}$ | | dB | -1.75 | 20 | -4.0 |
| RSRP Note3 | Bands FDD_A Note 8 | dBm/15 kHz | -86.75 | -88.50 | -123.5 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -123 |
| | Bands FDD_C | | | | -122.5 |
| | Bands FDD_D | | | | -122 |
| | Bands FDD_E, FDD_F Note 5 | | | | -121.5 |
| | Bands FDD_G Note 7 | | | | -120.5 |
| | Bands FDD_H | | | | -120 |
| RS-SINR Note3 | Bands FDD_A Note 8 | dB | -1.75 | 20 | -4.0 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Bands FDD_C | | | | |
| | Bands FDD_D | | | | |
| | Bands FDD_E, FDD_F Note 5 | | | | |
| | Bands FDD_G Note 7 | | | | |
| | Bands FDD_H | | | | |
| Io Note3 | Bands FDD_A Note 8 | dBm/9 MHz | -50.79 | -60.56 | -93.48 |
| | Bands FDD_B1, FDD_B2 Note 9 | | | | -92.98 |
| | Bands FDD_C | | | | -92.48 |
| | Bands FDD_D | | | | -91.98 |
| | Bands FDD_E, FDD_F Note 5 | | | | -91.48 |
| | Bands FDD_G Note 7 | | | | -90.48 |
| | Bands FDD_H | | | | -89.98 |
| CRS $\hat{E}_s / N_{oc1}$ | | dB | -1.75 | 20 | -4.0 |
| Propagation condition | | - | AWGN | AWGN | AWGN |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc1}$ to be fulfilled.

Note 2a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc2}$ to be fulfilled.

Note 3: RS-SINR, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP and RS-SINR minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 6: E-UTRA operating band groups are as defined in Section 3.5.

Note 7: Except Band 29.

Note 8: Except Band 32, Band 75, Band 76.

Note 9: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.9.13.6.3 Test Requirements

The RS-SINR measurement accuracy shall fulfil the requirements in Sections 9.1.17.3.

## A.9.14 Channel quality reporting accuracy

### A.9.14.1 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under normal coverage

#### A.9.14.1.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

#### A.9.14.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.1.2-1 and A.9.14.1.2-2.

**Table A.9.14.1.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| NB-IoT operational mode | | Standalone |
| CP Length | | Normal |
| DRX | | OFF |
| NPRACH configuration | | As specified in A.3.18 |
| NPUSCH repetition level | | 1 |

**Table A.9.14.1.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Test 1 |
|---|---|---|
| $BW_{channel}$ | kHz | 200 |
| NPDCCH parameter | | R.31 HD-FDD |
| NPDCCH repetition level for RAR | | 4 |
| NPBCH_RB | dB | 0 |
| NPSS_RA | dB | |
| NSSS_RA | dB | |
| NPDCCH_RA | dB | |
| NPDCCH_RB | dB | |
| NPDSCH_RA | dB | |
| NPDSCH_RB | dB | |
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| NRS $\hat{E}_s / N_{oc}$ | dB | -6 |
| Propagation condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Scheduling delay in RAR ($I_{Delay}$) Note3 | | 0 |
| Channel quality IE Note4 | | CQI-NPDCCH-NB |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3: See section 16.3.3 in TS 36.213 [23].
Note 4: See TS 36.331 [2].

### A.9.14.1.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

## A.9.14.2 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category NB1 Standalone mode under enhanced coverage

### A.9.14.2.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

### A.9.14.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.2.2-1 and A.9.14.2.2-2.

**Table A.9.14.2.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Value |
|---|---|---|
| NB-IoT operational mode | | Standalone |
| CP Length | | Normal |
| DRX | | OFF |
| NPRACH configuration | | As specified in A.3.18 |
| NPUSCH repetition level | | 1 |

**Table A.9.14.2.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Test 1 |
|---|---|---|
| $BW_{channel}$ | kHz | 200 |
| NPDCCH parameter | | R.31 HD-FDD |
| NPDCCH repetition level for RAR | | 16 |
| NPBCH_RB | dB | 0 |
| NPSS_RA | dB | |
| NSSS_RA | dB | |
| NPDCCH_RA | dB | |
| NPDCCH_RB | dB | |
| NPDSCH_RA | dB | |
| NPDSCH_RB | dB | |
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| NRS $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Scheduling delay in RAR ($I_{Delay}$) Note3 | | 0 |
| Channel quality IE Note4 | | CQI-NPDCCH-NB |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: See section 16.3.3 in TS 36.213 [23].

Note 4: See TS 36.331 [2].

### A.9.14.2.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

## A.9.14.3 E-UTRAN HD-FDD Downlink channel quality reporting accuracy on non-anchor carrier for UE Category NB1 Standalone mode under normal coverage

### A.9.14.3.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy on non-anchor carrier is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

### A.9.14.3.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy on non-anchor carrier is tested by using the parameters in Tables A.9.14.3.2-1 and A.9.14.3.2-2.

**Table A.9.14.3.2-1: General Test Parameters for Downlink channel quality reporting accuracy test on non-anchor carrier for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Value |
|---|---|---|
| NB-IoT operational mode | | Standalone |
| CP Length | | Normal |
| DRX | | OFF |
| NPRACH configuration | | As specified in A.3.18 |
| NPUSCH repetition level | | 1 |
| NPDCCH carrier index (npdcch-CarrierIndex-r14) | | 1 (Note 1) |
| Note 1: Index of non-anchor carrier configured in SystemInformationBlockType22-NB (See TS 36.331 [2]) | | |

**Table A.9.14.3.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test on non-anchor carrier for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Test 1 |
|---|---|---|
| $BW_{channel}$ | kHz | 200 |
| NPDCCH parameter | | R.31 HD-FDD |
| NPDCCH repetition level for RAR on non-anchor | | 4 |
| NPBCH_RB | dB | 0 |
| NPSS_RA | dB | |
| NSSS_RA | dB | |
| NPDCCH_RA | dB | |
| NPDCCH_RB | dB | |
| NPDSCH_RA | dB | |
| NPDSCH_RB | dB | |
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| NRS $\hat{E}_s / N_{oc}$ | dB | -6 |
| Propagation condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Scheduling delay in RAR ($I_{Delay}$) Note3 | | 0 |
| Channel quality IE Note4 | | CQI-NPDCCH-NB |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: See section 16.3.3 in TS 36.213 [23].<br>Note 4: See TS 36.331 [2]. | | |

### A.9.14.3.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

# A.9.14.4 E-UTRAN HD-FDD Downlink channel quality reporting accuracy on non-anchor carrier for UE Category NB1 Standalone mode under enhanced coverage

## A.9.14.4.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy on non-anchor carrier is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

## A.9.14.4.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy on non-anchor carrier is tested by using the parameters in Tables A.9.14.4.2-1 and A.9.14.4.2-2.

**Table A.9.14.4.2-1: General Test Parameters for Downlink channel quality reporting accuracy test on non-anchor carrier for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Value |
|---|---|---|
| NB-IoT operational mode | | Standalone |
| CP Length | | Normal |
| DRX | | OFF |
| NPRACH configuration | | As specified in A.3.18 |
| NPUSCH repetition level | | 1 |
| NPDCCH carrier index (npdcch-CarrierIndex-r14) | | 1 (Note 1) |
| Note 1: Index of non-anchor carrier configured in SystemInformationBlockType22-NB (See TS 36.331 [2]). | | |

**Table A.9.14.4.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test on non-anchor carrier for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Test 1 |
|---|---|---|
| $BW_{channel}$ | kHz | 200 |
| NPDCCH parameter | | R.31 HD-FDD |
| NPDCCH repetition level for RAR on non-anchor | | 16 |
| NPBCH_RB | dB | 0 |
| NPSS_RA | dB | |
| NSSS_RA | dB | |
| NPDCCH_RA | dB | |
| NPDCCH_RB | dB | |
| NPDSCH_RA | dB | |
| NPDSCH_RB | dB | |
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| NRS $\hat{E}_s / N_{oc}$ | dB | -12 |
| Propagation condition | | AWGN |
| Antenna Configuration | | 2x1 |
| Scheduling delay in RAR ($I_{Delay}$) Note3 | | 0 |
| Channel quality IE Note4 | | CQI-NPDCCH-NB |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. | | |

| | |
|---|---|
| Note 2: | Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled. |
| Note 3: | See section 16.3.3 in TS 36.213 [23]. |
| Note 4: | See TS 36.331 [2]. |

### A.9.14.4.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

## A.9.14.5 E-UTRAN HD-FDD Downlink channel quality reporting accuracy in RRC_CONNECTED for UE Category NB1 Standalone mode under normal coverage

### A.9.14.5.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

### A.9.14.5.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The tests consist of two successive time periods of length T1 and T2, respectively, at different SNR levels. The start of T2 coincides with the start of the channel quality measurement period specified in section 8.14.4. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.5.2-1 and A.9.14.5.2-2.

**Table A.9.14.5.2-1: General Test Parameters for Downlink channel quality reporting accuracy test in RRC_CONNECTED for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Standalone | |
| CP Length | | Normal | |
| DRX | | OFF | |
| NPUSCH repetition level | | 1 | |
| T1 | s | 1 | Initialization period |
| T2 Note 1 | s | - | Evaluation period |
| Note 1: This time period starts at the beginning of the NPDCCH period that carries the uplink grant for the channel quality report (section 8.14.4). | | | |

**Table A.9.14.5.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test in RRC_CONNECTED for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under normal coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | kHz | 200 | |
| NPDCCH parameter | | R.31 HD-FDD | |
| NPDCCH repetition Note4 | | 4 | |
| NPBCH_RB | dB | 0 | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |

| | | | |
|---|---|---|---|
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | |
| NRS $\hat{E}_s / N_{oc}$ | dB | 3 | -6 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality IE Note3 | | CQI-NPDCCH-NB | |
| Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.<br>Note 3: See TS 36.331 [2].<br>Note 4: The NPDCCH repetition level shall be adjusted during T2 based on the DL channel quality report so that the requirements in Table 9.1.22.16-1 can be verified. | | | |

### A.9.14.5.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

## A.9.14.6 E-UTRAN HD-FDD Downlink channel quality reporting accuracy in RRC_CONNECTED for UE Category NB1 Standalone mode under enhanced coverage

### A.9.14.6.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.22.16.

### A.9.14.6.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The tests consist of two successive time periods of length T1 and T2, respectively, at different SNR levels. The start of T2 coincides with the start of the channel quality measurement period specified in section 8.14.4. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.6.2-1 and A.9.14.6.2-2.

**Table A.9.14.6.2-1: General Test Parameters for Downlink channel quality reporting accuracy test in RRC_CONNECTED for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| NB-IoT operational mode | | Standalone | |
| CP Length | | Normal | |
| DRX | | OFF | |
| NPUSCH repetition level | | 1 | |
| T1 | s | 1 | Initialization period |
| T2 Note 1 | s | - | Evaluation period |
| Note 1: This time period starts at the beginning of the NPDCCH period that carries the uplink grant for the channel quality report (section 8.14.4). | | | |

**Table A.9.14.6.2-2: nCell specific Test Parameters for Downlink channel quality reporting accuracy test in RRC_CONNECTED for E-UTRAN HD-FDD Category NB1 UE in Standalone mode under enhanced coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |

| | | | |
|---|---|---|---|
| $BW_{channel}$ | kHz | 200 | |
| NPDCCH parameter | | R.31 HD-FDD | |
| NPDCCH repetition Note4 | | 16 | |
| NPBCH_RB | dB | 0 | |
| NPSS_RA | dB | | |
| NSSS_RA | dB | | |
| NPDCCH_RA | dB | | |
| NPDCCH_RB | dB | | |
| NPDSCH_RA | dB | | |
| NPDSCH_RB | dB | | |
| OCNG_RA Note1 | dB | | |
| OCNG_RB Note1 | dB | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | |
| NRS $\hat{E}_s / N_{oc}$ | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality IE Note3 | | CQI-NPDCCH-NB | |

Note 1: OCNG shall be used such that active cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test are assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: See TS 36.331 [2].

Note 4: The NPDCCH repetition level shall be adjusted during T2 based on the DL channel quality report so that the requirements in Table 9.1.22.16-1 can be verified.

### A.9.14.6.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.22.16.

## A.9.14.7 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode A

### A.9.14.7.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

### A.9.14.7.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.7.2-1 and A.9.14.7.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.7.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode A**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 8.13.2.8-2. |
| M-PDCCH repetition level | | 1 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |

| | |
|---|---|
| Note 1: | The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-3. |

**Table A.9.14.7.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode A**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.1 | | R.17 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | |
| $\rho_A$, $\rho_B$ | | -3 | |
| MPDCCH_RA | dB | 0 | |
| MPDCCH_RB | dB | 0 | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 6 | 0 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.

### A.9.14.7.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

## A.9.14.8 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode A

### A.9.14.8.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

### A.9.14.8.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.8.2-1 and A.9.14.8.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.8.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode A**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 8.13.2.8-2. |
| M-PDCCH repetition level | | 1 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-4. | | | |

**Table A.9.14.8.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode A**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.2 | | R.7 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.21 FDD | |
| $\rho_A$, $\rho_B$ | | -3 | |
| MPDCCH_RA | dB | 0 | |
| MPDCCH_RB | dB | 0 | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 6 | 0 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.<br>Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. | | | |

## A.9.14.8.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

# A.9.14.9 E-UTRAN TDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode A

## A.9.14.9.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

## A.9.14.9.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.9.2-1 and A.9.14.9.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.9.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE in CE Mode A**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 8.13.2.8-2. |
| M-PDCCH repetition level | | 1 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-3. | | | |

**Table A.9.14.9.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE in CE Mode A**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration Note 5 | | 6 | |
| Uplink-downlink configuration Note 5 | | 1 | |
| MPDCCH parameters as defined in A.3.1.3.3 | | R.15 TDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.11 TDD | |
| $\rho_A$, $\rho_B$ | | -3 | |
| MPDCCH_RA | dB | 0 | |
| MPDCCH_RB | dB | 0 | |
| PBCH_RA | dB | -3 | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 6 | 0 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 3: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 4: | SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. |
| Note 5: | For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211. |

### A.9.14.9.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

# A.9.14.10 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode B

## A.9.14.10.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

## A.9.14.10.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.10.2-1 and A.9.14.10.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.10.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode B**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 8.13.3.8-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-1. | | | |

**Table A.9.14.10.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode B**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 3: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 4: | SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. |

### A.9.14.10.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

## A.9.14.11 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode B

### A.9.14.11.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

### A.9.14.11.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.11.2-1 and A.9.14.11.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.11.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode B**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 8.13.3.8-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-2. | | | |

**Table A.9.14.11.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode B**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |

| | | | |
|---|---|---|---|
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.

### A.9.14.11.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

## A.9.14.12 E-UTRAN TDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode B

### A.9.14.12.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

### A.9.14.12.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.12.2-1 and A.9.14.12.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report ("Regular DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.12.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE in CE Mode B**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 8.13.3.8-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 | s | 1 | |
| T2 Note 1 | s | ≥ 1 | |

Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-1.

**Table A.9.14.12.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE in CE Mode B**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |

| | | | |
|---|---|---|---|
| Special subframe configuration Note 5 | | 6 | |
| Uplink-downlink configuration Note 5 | | 1 | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.2 TDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.
Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

### A.9.14.12.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

## A.9.14.13 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 under normal coverage

### A.9.14.13.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

### A.9.14.13.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.13.2-1 and A.9.14.13.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.13.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE under normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |
| Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.<br>Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-1. | | | |

**Table A.9.14.13.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE under normal coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -6 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.<br>Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. | | | |

### A.9.14.13.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

## A.9.14.14 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 under normal coverage

### A.9.14.14.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

## A.9.14.14.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.14.2-1 and A.9.14.14.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.14.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE under normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |
| Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.<br>Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-2. | | | |

**Table A.9.14.14.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE under normal coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -6 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.<br>Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.<br>Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.<br>Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. | | | |

### A.9.14.14.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

## A.9.14.15 E-UTRAN TDD Downlink channel quality reporting accuracy for UE Category M1 under normal coverage

### A.9.14.15.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.23.

### A.9.14.15.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.15.2-1 and A.9.14.15.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.15.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE under normal coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1A | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |
| Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.<br>Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-1. | | | |

**Table A.9.14.15.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE under normal coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration Note 5 | | 6 | |
| Uplink-downlink configuration Note 5 | | 1 | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.2 TDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |

| | | | |
|---|---|---|---|
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -6 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.

Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.

Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

### A.9.14.15.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.23.

# A.9.14.16 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 under enhanced coverage

## A.9.14.16.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

## A.9.14.16.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.16.2-1 and A.9.14.16.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.16.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |
| Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.<br>Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-1. | | | |

**Table A.9.14.16.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.4 | | R.19 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

| | |
|---|---|
| Note 1: | OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. |
| Note 2: | The signal contains PDCCH for UEs other than the device under test as part of OCNG. |
| Note 3: | SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs. |
| Note 4: | SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed. |

### A.9.14.16.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

## A.9.14.17 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 under enhanced coverage

### A.9.14.17.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

### A.9.14.17.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.17.2-1 and A.9.14.17.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.17.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |
| Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.<br>Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-2. | | | |

**Table A.9.14.17.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| MPDCCH parameters as defined in A.3.1.3.5 | | R.9 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.6 FDD | |
| MPDCCH_RA | dB | | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |

| | | | |
|---|---|---|---|
| PBCH_RB | dB | -3 | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.

### A.9.14.17.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

## A.9.14.18 E-UTRAN TDD Downlink channel quality reporting accuracy for UE Category M1 under enhanced coverage

### A.9.14.18.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in idle mode is within the specified limits. This test will verify the requirements in Section 9.1.21.24.

### A.9.14.18.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MSG3-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.9.14.18.2-1 and A.9.14.18.2-2. There are two time periods T1 and T2 with different SNR levels. The start of T2 coincides with the start of the channel quality measurement period defined in clause 4.7.3. The UE transmits the downlink channel quality report ("Msg3 DCQR") as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

**Table A.9.14.18.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| CP length | | Normal | |
| DRX | | OFF | |
| DCI format | | 6-1B | As defined in Table 4.7.3-1. |
| M-PDCCH aggregation level | | 24 | |
| T1 Note 1 | s | 1 | |
| T2 Note 2 | s | - | |

Note 1: Prior to this period the UE has camped on the active cell and is in idle mode. The UE initiates a random access procedure.
Note 2: This period begins from the start of the random access response. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-1.

**Table A.9.14.18.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN TDD Category M1 UE under enhanced coverage**

| Parameter | Unit | Test 1 | |
|---|---|---|---|
| | | T1 | T2 |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration Note 5 | | 6 | |
| Uplink-downlink configuration Note 5 | | 1 | |
| MPDCCH parameters as defined in A.3.1.3.6 | | R.17 TDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) | | OP.2 TDD | |
| MPDCCH_RA | dB | -3 | |
| MPDCCH_RB | dB | | |
| PBCH_RA | dB | | |
| PBCH_RB | dB | | |
| PSS_RA | dB | | |
| SSS_RA | dB | | |
| OCNG_RA Note 1 | dB | | |
| OCNG_RB Note 1 | dB | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition | | AWGN | |
| Antenna Configuration | | 2x1 | |
| Channel quality report Note 4 | | As defined in Table 9.1.21.22-1 | |

Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.
Note 4: SIB2 field mpdcch-CQI-Reporting set to 'fourBits' indicates 4-bit CQI reporting is allowed.
Note 5: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211.

### A.9.14.18.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21.24.

# A.10 Proximity-based Services in Any Cell Selection State

## A.10.1 E-UTRAN FDD – UE ProSe Direct Communication Transmission Timing Accuracy Test

### A.10.1.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for ProSe Direct Communication transmissions in Any Cell Selection state defined in clause 11.2.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A.10.1.1-1 below. There is no serving cell and one active SyncRef UE in this test. The test system shall emulate the SyncRef UE to transmit SLSS and MIB-SL every synchronization period.

The test system will configure the ProSe UE to transmit SLSS in each period (40ms) by configuring *syncTxThreshOoC* as +infinity in the pre-configured parameters. The ProSe UE is expected to synchronize to the SyncRef UE and transmit its own SLSS and SL-MIB in accordance to the procedure specified in clause 5.10.7.3 of TS 36.331.

The transmit timing is verified using the transmission timing of SLSS transmissions.

**Table A.10.1.1-1: Test parameters for ProSe Transmission Timig Accuracy test for E-UTRAN FDD**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | | None | |
| Active SyncRef UE | | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on uplink of RF channel number 1 |
| ProSe Direct Communication preconfiguration | | | As specified in Table A.3.12.5-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| syncTxThreshOoC | | | 11 (+infinity) | |
| $N_{oc}$ | | dBm/15 kHz | -98 | |
| SyncRef UE 1 | syncCP-Len | | Normal | |
| | syncOffsetIndicator | | Set same as *syncOffsetIndicator1* in ProSe Direct Communication preconfiguration | |
| | slssid | | 30 | |
| | inCoverage | | TRUE | In MIB-SL |
| | networkControlledSyncTx | | ON | |
| | ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-1 (Configuration #1) | IE values unless specified otherwise in this test; Note resource pool is same as Configuration #2 used by ProSe UE. |
| | $\hat{E}_s/N_{oc}$ | | 3 | |
| | S-RSRP Note1, Note 2 | | -95 | |
| Propagation condition | | | AWGN | |
| Note 1: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.<br>Note 2: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot. | | | | |

## A.10.1.2 Test Requirements

For parameters specified in Tables A.10.1.1-1, the timing accuracy for ProSe Direct Communication transmissions shall be within the limits defined in clause 11.2.2. The timing accuracy is verified using SLSS transmissions.

Prior to start of test, test system is required to ensure that the ProSe UE is synchornized to the SyncRef UE 1 and is transmitting SLSS + MIB-SL as derived from the SLSS + MIB-SL of SyncRef UE 1 as per clause 5.10.7.3 of TS 36.331. For the test configuration, the SLSSID used by the ProSe UE shall be 30 with *inCoverage* IE in MIB-SL set as FALSE.

The following sequence of events shall be used to verify that the requirements are met.

For 5MHz or 10MHz channel bandwith, the test sequence shall be carried out in Any Cell Selection state.

a) After the ProSe UE is synchronized to SyncRef UE 1, the test system shall verify that the ProSe UE SLSS transmission timing offset is within ± 24×$T_S$ with respect to the first detected path (in time) of the corresponding frame of SyncRef UE 1.

b) The test system adjusts the transmit timing of SyncRef UE 1 by +24×$T_S$ compared to that in (a). The test system shall wait for at least one SLSS period (40ms) before verifying the requirement again in (c).

c) The test system shall verify that the UE SLSS transmissiontiming offset stays within ± 24×$T_S$ with respect to the first detected path (in time) of the corresponding frame of SyncRef UE 1.

# A.10.2 E-UTRAN FDD – Initiation/Cease of SLSS Transmission with ProSe Direct Communication

## A.10.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the evaluation time allowed to initiate and cease SLSS transmissions in Any Cell Selection state defined in clause 11.3.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A. X.2.1-1 and Table A.10.2.1-2 below. There are no active cells in this test. There is one active SyncRef UE (SyncRef UE 1) in this test. The test system shall emulate SyncRef UE 1 to transmit SLSS and MIB-SL every synchronization period.

Prior to start of test, test system is required to ensure that the ProSe UE is synchornized to the SyncRef UE 1 and is transmitting SLSS + MIB-SL as derived from the SLSS + MIB-SL of SyncRef UE 1 as per clause 5.10.7.3 of TS 36.331. For the test configuration, the SLSSID used by the ProSe UE shall be 30 with *inCoverage* IE in MIB-SL set as FALSE.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the S-RSRP of SyncRef UE 1 is above *syncTxThreshOOC* and the UE is not expected to be transmitting SLSS. During T2, the S-RSRP of SyncRef UE 1 is lowered below *syncTxThreshOOC* and the UE is expected to initiate SLSS transmissions. During T3, the S-RSRP of SyncRef UE 1 is increased back to be above *syncTxThreshOOC* and the UE is expected to cease SLSS transmissions.

**Table A.10.2.1-1: Test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | None | |
| Active SyncRef UE | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on uplink of RF channel number 1 |
| ProSe Direct Communication preconfiguration | | As specified in Table A.3.12.5-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| syncTxThreshOoC | dBm/15 kHz | -95 | |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.10.2.1-2: SyncRef UE specific test parameters for initiation/cease of SLSS transmissions test for E-UTRAN FDD**

| Parameter | Unit | SyncRef UE 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ Note 4 | MHz | 5 or 10 | | |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-1 (Configuration #1) Note resource pool is same as Configuration #2 used by ProSe UE. | | |
| syncOffsetIndicator | | Set same as *syncOffsetIndicator1* in ProSe Direct Communication preconfiguration | | |
| slssid | | 30 | | |
| inCoverage | | TRUE | | |
| networkControlledSyncTx | | ON | | |

| | | | | |
|---|---|---|---|---|
| $N_{oc}$ Note1 | dBm/15 kHz | -96 | | |
| $\hat{E}_s / N_{oc}$ | dB | 5.5 | -3.5 | 5.5 |
| S-RSRP Note2, Note3 | dBm/15 kHz | -90.5 | -99.5 | -90.5 |
| Propagation Condition | | AWGN | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

Note 4: This test is according to the principle defined in section A.3.12.3.

## A.10.2.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 0.84 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 0.84 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 0.8 sec (clause 11.3.2) for the parameters in this test;

SLSS period is set as 40ms in this test.

# A.10.3 E-UTRAN FDD – SyncRef UE Selection / Reselection Test

## A.10.3.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection in Any Cell Selection state defined in clause 11.5.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A. X.3.1-1 and Table A.10.3.1-2 below. There are no active cells in this test. There are two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test. The test system shall emulate SyncRef UE 1 and SyncRef UE 2 to transmit SLSS and MIB-SL every SLSS period (40ms).

The test system can verify the selection / reselection of SyncRef UE by monitoring the SLSS ID used by the ProSe UE for its SLSS+MIB-SL transmissions. When the ProSe UE is not synchronized to any SyncRef UE, then the ProSe UE shall use the SLSS ID pre-configured in the ProSe UE. When the ProSe UE is synchronized to a SyncRef UE, the ProSe UE shall derive its SLSS ID from the SLSS ID of the SyncRef UE as per clause 5.10.7.3 of TS 36.331.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off and the ProSe UE is expected to transmit SLSS as an independent synchronization source. During T1, SyncRef UE 1 is powered ON and the ProSe UE will select SyncRef UE 1 as the synchronization source. During T2, a higher priority SyncRef UE 2 is additionally powered ON and the ProSe UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.

**Table A.10.3.1-1: Test parameters for SyncRef UE selection/reselection test for E-UTRAN FDD**

| Parameter | Unit | Value | Comment |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Initial condition | Active synchronization source | | Independent synchronization source | UE transmits for ProSe Direct Communication and SLSS+MIB-SL with some random SLSS ID and in-coverage set as FALSE in MIB-SL. |
| T2 end condition | Active synchronization source | | Sync Ref UE 1 | UE transmits for ProSe Direct Communication and SLSS+MIB-SL with SLSS ID = 168+59 and in-coverage set as FALSE in MIB-SL. |
| Final condition | Active synchronization source | | Sync Ref UE 2 | UE transmits for ProSe Direct Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as FALSE in MIB-SL. |
| E-UTRA RF Channel Number | | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | | None | |
| Active SyncRef UEs | | | SyncRef UE 1<br>SyncRef UE 2 | Transmitting SLSS+MIB-SL on uplink of RF channel number 1 |
| Timing offset between SyncRef UE 1 and SyncRef UE 2 | | ms | 3 | Asynchronous |
| Frequency offset of SyncRef UE 1 | | ppm | 0 | |
| Frequency offset of SyncRef UE 2 | | ppm | 5 | |
| ProSe Direct Communication preconfiguration | | | As specified in Table A.3.12.5-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| syncTxThreshOoC | | | 11 (+infinity) | |
| T1 | | s | 24 | |
| T2 | | s | 24 | |
| T3 | | s | 24 | |

**Table A.10.3.1-2: SyncRef UE specific test parameters for SyncRef UE selection/reselection test for E-UTRAN FDD**

| Parameter | Unit | SyncRef UE 1 | | | SyncRef UE 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ Note 4 | MHz | 5 or 10 | | | | | |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-2 (Configuration #2) | | | As specified in Table A.3.12.5-1 (Configuration #1) | | |
| networkControlledSyncTx | | N/A | | | ON | | |
| syncTxThreshOoC | dBm/15 kHz | +infinity | | | N/A | | |
| slssid | | 59 | | | 30 | | |
| inCoverage (in MIB-SL) | | FALSE | | | TRUE | | |
| syncOffsetIndicator | | syncOffsetIndicator2 | | | syncOffsetIndicator1 | | |
| $N_{oc}$ Note1 | dBm/15 kHz | -98 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 16 | 16 | -infinity | -infinity | 13 |
| $\hat{E}_s / I_{ot}$ | dB | -infinity | 16 | 2.79 | -infinity | -infinity | -3.11 |
| S-RSRP Note2, Note 3 | dBm/15 kHz | -infinity | -82 | -82 | -infinity | -infinity | -85 |
| Propagation Condition | | AWGN | | | | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

Note 4: This test is according to the principle defined in section A.3.12.3.

### A.10.3.2 Test Requirements

SyncRef UE selection delay is defined as the time from the beginning of T2 to the time UE is synchronized to SyncRef UE 1 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 168+59 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T2.

The SyncRef UE selection delay shall be less than 20.84sec.

SyncRef UE reselection delay is defined as the time from the beginning of T3 to the time UE changes its synchronization source from SyncRef UE 1 to SyncRef UE 2, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 2 as the synchronization source. For the test configuration, the SLSS ID will be changed o 30 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE reselection delay shall be less than 20.84sec.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

The test system will verify that the ProSe UE does not drop or delay more than 2% of its SLSS transmissions during the duration of T1, T2, and T3.

The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 20sec (as specified in sub-clause 11.5.2.2)
- $T_{evaluate,SLSS}$ = 0.8 (as specified in sub-clause 11.3.2)
- SLSS period = 40ms

This gives a total of 20.84 seconds.

## A.10.4 E-UTRAN FDD – Cell Identification on downlink frequency associated with ProSe frequency (when UE is transmitting for ProSe)

### A.10.4.1 Test Purpose and Environment

The purpose of this test is to verify cell identification delay requirement for a newly detectable cell on the downink frequency associated with the pre-configured ProSe carrier frequency in Any Cell Selection state. This test will verify the requirements in clause 11.4 when the UE is transmitting for ProSe.

For this test, the UE is triggered by the test loop function or the upper layers to transmit for ProSe Direct Communication.

The test parameters are given in Table A. 10.4.1-1, Table A. 10.4.1-2, and Table A.10.4.1-3 below. There is one active cell (Cell 1) and active SyncRef UE (SyncRef UE 1) in this test. The test system shall emulate SyncRef UE 1 to transmit SLSS and MIB-SL every SLSS period (40ms).

The test consists of two successive time periods, with time duration of T1 and T2 respectively. During T1, the cell is powered OFF and the ProSe UE is synchronized to SyncRef UE 1. During T2, the cell is powered ON and the ProSe UE will detect the cell and attempt to camp on the cell.

Prior to start of test, test system is required to ensure that the ProSe UE is synchornized to the SyncRef UE 1 and is transmitting SLSS + MIB-SL as derived from the SLSS + MIB-SL of SyncRef UE 1 as per clause 5.10.7.3 of TS 36.331. For the test configuration, the SLSSID used by the ProSe UE shall be 30 with *inCoverage* IE in MIB-SL set as FALSE.

**Table A.10.4.1-1: Test parameters for cell identification test on on downlink frequency associated with ProSe frequency for E-UTRAN FDD (when UE is transmitting for ProSe)**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active synchronization source | | Sync Ref UE 1 | |
| Final condition | Active synchronization source | | Cell1 | |
| E-UTRA RF Channel Number | | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 5 or 10 | According to principle defined in clause A.3.12.3 |
| Active cell | | | Cell1 | |
| Active SyncRef UEs | | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on uplink of RF channel number 1 |
| ProSe Direct Communication preconfiguration | | | As specified in Table A.3.12.5-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| syncTxThreshOoC | | | 11 (+infinity) | |
| T1 | | s | 2 | |
| T2 | | s | 30 | |

**Table A.10.4.1-2: Cell specific test parameters for cell identification test on on downlink frequency associated with ProSe frequency for E-UTRAN FDD (when UE is transmitting for ProSe)**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ Note 4 | MHz | 5 or 10 | |
| OCNG Patterns defined in A.3.2.1.2 Note 4 | | 5 MHz: OP.16 FDD<br>10 MHz: OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA Note 1 | | | |
| OCNG_RB Note 1 | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | -3 |
| RSRP Note3 | dBm/15 kHz | -infinity | -101 |
| SCH_RP Note3 | dBm/15 kHz | -infinity | -101 |
| Propagation Condition | | AWGN | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: This test is according to the principle defined in section A.3.12.3.

**Table A.10.4.1-3: SyncRef UE specific test parameters for cell identification test on on downlink frequency associated with ProSe frequency for E-UTRAN FDD**

| Parameter | Unit | SyncRef UE 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 (Uplink) | |

| | | |
|---|---|---|
| $BW_{channel}$ Note 4 | MHz | 5 or 10 |
| ProSe Direct Communication resource pool configuration | | As specified in Table A.3.12.5-1 (Configuration #1) |
| networkControlledSyncTx | | ON |
| slssid | | 30 |
| inCoverage (in MIB-SL) | | TRUE |
| syncOffsetIndicator | | syncOffsetIndicator1 |
| $N_{oc}$ Note1 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 13 |
| S-RSRP Note2, Note3 | dBm/15 kHz | -85 |
| Propagation Condition | | AWGN |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 2: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.
Note 4: This test is according to the principle defined in section A.3.12.3.

### A.10.4.2 Test Requirements

The cell selection delay to a newly detectable cell on the downlink associated with the preconfigured ProSe carrier is defined as the time from the beginning of T2 to the time UE camps on the cell and starts to send preambles on the PRACH for sending the RRC CONNECTION REQUEST.

The cell selection delay to a newly detectable cell on the downlink associated with the preconfigured ProSe carrier shall be less than 7.68 s.

The cell selection delay can be expressed as $T_{basic_identify_OoC_ProSe\ Tx_ON} + T_{SI}$, where

- $T_{basic_identify_OoC_ProSe\ Tx_ON}$ = 6.4sec as specified in sub-clause 11.4.2.2
- $T_{SI}$ = Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case

This gives a total of 7.68 sec.

## A.11 V2V Sidelink Communication for V2V Operation on Dedicated V2V Carrier

## A.11.1 V2V UE Transmission Timing Accuracy Test

### A.11.1.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for V2V sidelink transmissions specified in clause 12.2.

For this test, the UE is triggered by the test loop function to transmit for V2V sidelink Communication.

Table A.11.1.1-1 defines test parameters for UE transmit timing accuracy tests for V2V. There is one GNSS based synchronization source during the test. The test system can emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in B.6.1.

The transmit timing accuracy is verified by the UE transmitting PSSCH and PSCCH.

UE is not expected to receive any configuration related to V2V sidelink communication from the serving cell.

The test parameters of pre-configuration for V2V sidelink communication is defined in Table A.3.21.2-1.

**Table A.11.1.1-1: Test Parameters for UE Transmit Timing Accuracy Tests for V2V**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| RF Channel Number | | 1 | |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | Band 47 TDD |
| V2V SL Communication preconfiguration | | Defined in Table A.3.21.2-1 | |
| PSCCH Reference Measurement Channel | | Defined in Table A.3.21.3-1 | |
| PSSCH Reference Measurement Channel | | Defined in Table A.3.21.3-2 | |
| Propagation condition | | AWGN | |

### A.11.1.2 Test requirements

For parameters specified in Tables A.11.1.1-1, the timing accuracy for V2V sidelink transmission shall be within the limits defined in clause 12.2.1. The timing accuracy is verified by using PSSCH and PSCCH transmissions.

The following sequence of events shall be used to verify that the requirements are met:

- After the UE is synchronized to the GNSS synchronization source, the test system shall verify that the UE PSSCH and PSCCH transmission timing offset is within ± 12×Ts with respect to the GNSS reference time.

## A.11.2 Interruptions due to V2V sidelink communication

### A.11.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements as defined in clause 12.3, related to interruptions due to V2V sidelink communication under the following additional conditions:

- the UE is pre-configured with parameters for enabling the UE to acquire timing synchronization
- the UE has dedicated transmitter chain and dedicated receiver chain for the V2V operation.

This test is applicable for V2V sidelink communication capable UEs that performs independent concurrent E-UTRAN operation in an E-UTRA band and stand-alone V2V sidelink operation in Band 47. If UE supports multiple bands, the UE needs to be tested only with the band with highest frequency.

In the test, the UE under test is configured with PCell on a serving frequency in the E-UTRA band, and is pre-configured with V2V sidelink communication resources for a non-serving frequency in Band 47. The test consists of one active serving cell (cell 1) on the serving RF channel 1, and there is no active cell on RF channel 2. There is no other UE in the test.

UE is not expected to receive any configuration related to V2V sidelink communication from the serving cell. Prior to the start of the test, UE is already synchronized to a GNSS source for V2V sidelink communication. The test system can emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in B.6.1.

At the beginning of the test, UE is triggered by the test loop function or the upper layers to receive and transmit V2V sidelink communication. The UE is continuously scheduled with PDSCH traffic on PCell downlink in RF channel 1 for a duration of 1s. The UE is then triggered by the test loop function or the upper layers to stop receiving and transmitting V2V sidelink communication before the end of the test.

The test parameters are given in Table A.11.2.1-1, Table A.11.2.1-2, and Table A.11.2.1-3 below.

**Table A.11.2.1-1: Test parameters for interruptions due to V2V sidelink communication**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1, 2 | RF channel 1 is serving<br>RF channel 2 is non-serving |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | On both Band 47 and E-UTRA band |
| Active cell | | Cell 1 | Serving cell on RF channel number 1 |

**Table A.11.2.1-2: Sidelink communication configuration for interruptions due to V2V**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| RF Channel Number | | 2 | Band 47 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | According to principle defined in clause A.3.21 |
| V2V sidelink communication resource pool configuration | | As specified in Table A.3.21.2-1 | IE values unless specified otherwise in this test. (Preconfigured) |
| PSCCH Reference Measurement Channel | | CC.1 | As specified in Table A.3.21.3-1 |
| PSSCH Reference Measurement Channel | | CD.1 | As specified in Table A.3.21.3-2 |

**Table A.11.2.1-3: Cell specific test parameters for interruptions due to V2V sidelink communication**

| Parameter | Unit | Cell1 |
|---|---|---|
| RF Channel Number | | 1 |
| Serving/Non-serving | | Serving |
| $BW_{channel}$ Note 5 | MHz | 10 |
| Correlation Matrix and Antenna Configuration | | 1x2 Low |
| drx-Configuration | | None |
| PDCCH/PCFICH/PHICH Reference measurement channel Note1, Note 5 | | R.6 FDD |
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1, Note 5 | | R.3 FDD |
| OCNG Pattern defined in A.3.2.1 | | OP.10 FDD |
| PCFICH_RB | dB | 0 |
| PDCCH_RA | dB | |
| PDCCH_RB | dB | |
| PBCH_RA | dB | |
| PBCH_RB | dB | |
| PSS_RA | dB | |
| SSS_RA | dB | |
| PHICH_RA | dB | |
| PHICH_RB | dB | |
| PDSCH_RA | dB | |
| PDSCH_RB | dB | |
| OCNG_RA Note1 | dB | |
| OCNG_RB Note1 | dB | |
| $\hat{E}_s / N_{oc}$ | dB | 16 |
| $N_{oc}$ | dBm/15 kHz | -98 |
| RSRP Note4 | dBm/15 kHz | -82 |
| SCH_RP Note 4 | dBm/15 kHz | -82 |
| Propagation condition | | AWGN |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 5: This test is according to the principle defined in section A.3.21.

## A.11.2.2 Test Requirements

The test system shall verify that no interruption is caused to the ACK/NACKs on the serving cell on RF channel 1 during the test.

# A.12

## A.12.1 V2X UE Transmission Timing Accuracy Test

### A.12.1.1 V2X UE Transmission Timing Accuracy Test for eNB as Timing Reference

#### A.12.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for V2X sidelink transmissions specified in clause 13.2.2, when the downlink timing of the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) on a non-V2X sidelink carrier is used as timing reference. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink communication.

Table A.12.1.1.1-1 and A.12.1.1.1-2 define test parameters for UE transmit timing accuracy tests for V2X sidelink Communication. There is one active cell (PCell) in this test. The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.

**Table A.12.1.1.1-1: V2XSidelink Test Parameters for V2X UE Transmit Timing Accuracy Test for eNB as Timing Reference**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | Band 47 TDD |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| V2X sidelink communication configuration | | As specified in Table A.3.22.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel | | CC.1A | Defined in Table A.3.22.3-1 |
| PSSCH Reference Measurement Channel | | CD.1A | Defined in Table A.3.22.3-2 |
| Propagation condition | | AWGN | |

**Table A.12.1.1.1-2: Cell Test parameters for V2X UE Transmit Timing Accuracy Test for eNB as Timing Reference**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 2 | FDD band |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | Cell 1 | E-UTRA FDD Cell1 on RF channel number 2 |
| CP length of Cell 1 | | Normal | |
| PDCCH/PCFICH/PHICH Reference measurement channel[Note1] | | R.6 FDD | |
| OCNG Pattern[Note2] | | OP.2 FDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| OCNG_RA[Note3] | | | |
| OCNG_RB[Note3] | | | |
| $N_{oc}$ | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 3 | |
| RSRP [Note4] | dBm/15 kHz | -95 | |

| | | | |
|---|---|---|---|
| SCH_RP Note 4 | dBm/15 kHz | -95 | |
| Propagation condition | | AWGN | |

Note 1: For the reference measurement channels, see clause A.3.1.
Note 2: For the OCNG pattern, see clause A.3.2.
Note 3: OCNG shall be used such that Cell 1 is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 4: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.12.1.1.2 Test requirements

For parameters specified in Tables A.12.1.1.1-1 and A.12.1.1.1-2, the timing accuracy for V2X sidelink transmission shall be within the limits defined in clause 13.2.2. The timing accuracy is verified by using PSSCH transmissions.

### A.12.1.2 V2X UE Transmission Timing Accuracy Test for SyncRef UE as Timing Reference

#### A.12.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the timing requirements for V2X sidelink transmissions specified in clause 13.2.3, when SyncRef UE is used as timing reference. For this test, the UE is triggered by the test loop function to transmit for V2X sidelink communication.

Table A.12.1.2.1-1 defines test parameters for UE transmit timing accuracy tests for V2X sidelink Communication. There is one active SyncRef UE in this test without either serving cell and or GNSS signals. Before the test starts, the UE has been synchronized to the SyncRef UE. The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.

**Table A.12.1.2.1-1: Test parameters for V2X UE Transmit Timing Accuracy Test for SyncRef UE as Timing Reference**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | Band 47 TDD |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| Active cell | | | None | |
| Active SyncRef UE | | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on uplink of RF channel number 1 |
| V2X sidelink communication configuration | | | As specified in Table A.3.22.2-2 (Configuration #1) | IE values unless specified otherwise in this test. |
| PSCCH Reference Measurement Channel | | | CC.1A | Defined in Table A.3.22.3-1 |
| PSSCH Reference Measurement Channel | | | CD.1A | Defined in Table A.3.22.3-2 |
| $N_{oc}$ | | dBm/15 kHz | -98 | |
| SyncRef UE 1 | syncCP-Len | | Normal | |
| | syncOffsetIndicator | | 3 | |
| | slssid | | 30 | |
| | inCoverage | | TRUE | In MIB-SL |
| | networkControlledSyncTx | | ON | |
| | V2X sidelink communication resource pool configuration | | As specified in Table A.3.22.2-2 (Configuration #2) | IE values unless specified otherwise in this test; Note resource pool is same as Configuration #1 used by V2X UE. |
| | $\hat{E}_s / N_{oc}$ | | 3 | |
| | S-RSRP Note1, Note 2 | | -95 | |
| Propagation condition | | | AWGN | |

Note 1: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 2: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

#### A.12.1.2.2 Test Requirements

For parameters specified in Tables A.12.1.2.1-1, the timing accuracy for V2X sidelink transmission shall be within the limits defined in clause 13.2.3. The timing accuracy is verified by using PSSCH transmissions.

## A.12.2 Initiation/Cease of SLSS Transmission with V2X Sidelink Communication

### A.12.2.1 Initiation/Cease of SLSS Transmission with V2X Sidelink Communication for eNB as Timing Reference

#### A.12.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the V2X UE meets the requirements related to the maximum evaluation time allowed to initiate and cease SLSS transmissions defined in clause 13.3.1.1, when the downlink timing of the serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) on a non-V2X sidelink carrier is used as timing reference. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink Communication.

The test parameters are given in Table A.12.2.1.1-1 and Table A.12.2.1.1-2 below. There is one active cell in this test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the RSRP of the PCell is above *syncTxThreshIC* and the UE is not expected to be transmitting SLSS. During T2, the RSRP of the PCell is lowered below *syncTxThreshIC* and the UE is expected to initiate SLSS transmissions. During T3, the RSRP of the PCell is increased back to be above *syncTxThreshIC* and the UE is expected to cease SLSS transmissions.

**Table A.12.2.1.1-1: Test Parameters for Initiation/Cease of SLSS Transmissions Test for eNB as Timing Reference**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| Active cell | | Cell 1 | Serving cell on RF channel number 1 |
| Active SyncRef UE | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on RF channel number 2 (TDD carrier in Band 47) |
| V2X sidelink Communication configuration | | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| networkControlledSyncTx | | Not configured | |
| syncTxThreshIC | dBm/15 kHz | -110 | In SIB21 |
| DRX | | OFF | |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.12.2.1.1-2: Cell Test Parameters for Initiation/Cease of SLSS Transmissions Test for eNB as Timing Reference**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.2 | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |

| | | | | |
|---|---|---|---|---|
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -110 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | -4.5 | 4.5 |
| RSRP Note3 | dBm/15 kHz | -105.5 | -114.5 | -105.5 |
| SCH_RP Note 3 | dBm/15 kHz | -105.5 | -114.5 | -105.5 |
| Io Note 3 | dBm/9 MHz | -76.4 | -80.9 | -76.4 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.12.2.1.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 0.56 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 0.56 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 0.4 sec (clause 13.3.1.1) for the parameters in this test;

SLSS period is set as 160ms in this test.

### A.12.2.2 Initiation/Cease of SLSS Transmission with V2X Sidelink Communication for SyncRef UE as Timing Reference

#### A.12.2.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to the evaluation time allowed to initiate and cease SLSS transmissions defined in clause 13.3.1.3, when SyncRef UE is used as timing reference. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink Communication.

The test parameters are given in Table A.12.2.2.1-1 and Table A.12.2.2.1-2 below. There are neither active cells and nor GNSS signals in this test. There is one active SyncRef UE (SyncRef UE 1) in this test. The test system shall emulate SyncRef UE 1 to transmit SLSS and MIB-SL every synchronization period.

Prior to start of test, test system is required to ensure that the V2X UE is synchornized to the SyncRef UE 1 and is transmitting SLSS + MIB-SL as derived from the SLSS + MIB-SL of SyncRef UE 1 as per clause 5.10.7.3 of TS 36.331. For the test configuration, the SLSSID used by the V2X UE shall be 30 with *inCoverage* IE in MIB-SL set as FALSE. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, the S-RSRP of SyncRef UE 1 is above *syncTxThreshOOC* and the UE is not expected to be transmitting SLSS.

During T2, the S-RSRP of SyncRef UE 1 is lowered below *syncTxThreshOOC* and the UE is expected to initiate SLSS transmissions. During T3, the S-RSRP of SyncRef UE 1 is increased back to be above *syncTxThreshOOC* and the UE is expected to cease SLSS transmissions.

**Table A.12.2.2.1-1: Test Parameters for Initiation/Cease of SLSS Transmissions Test for SyncRef UE as Timing Reference**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | TDD carrier in Band 47 is used. |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | | None | |
| Active SyncRef UE | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on RF channel number 1 |
| V2X sidelink Communication preconfiguration | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| syncTxThreshOoC | dBm/15 kHz | -100 | |
| T1 | s | 3 | |
| T2 | s | 5.24 | |
| T3 | s | 5.24 | |

**Table A.12.2.2.1-2: SyncRef UE Specific Test Parameters for Initiation/Cease of SLSS Transmissions Test for SyncRef UE as Timing Reference**

| Parameter | Unit | SyncRef UE 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| V2X sidelink Communication resource pool configuration | | As specified in Table A.3.24.2-1 (Configuration #1) Note resource pool is same as Configuration #1 used by V2X UE. | | |
| syncOffsetIndicator | | Set same as *syncOffsetIndicator1* in V2X sidelink Communication preconfiguration | | |
| slssid | | 30 | | |
| inCoverage | | TRUE | | |
| networkControlledSyncTx | | ON | | |
| $N_{oc}$ Note1 | dBm/15 kHz | -101 | | |
| PSBCH $\hat{E}_s / N_{oc}$ | dB | 5.5 | -3.5 | 5.5 |
| S-RSRP Note2, Note3 | dBm/15 kHz | -95.5 | -104.5 | -95.5 |
| Io | dBm/9MHz | -75.85 | -80.82 | -75.85 |
| Propagation Condition | | AWGN | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Noc and PSSS Es/Noc are set the same as PSBCH Es/Noc.

## A.12.2.2.2 Test Requirements

The SLSS transmission initiation delay is defined as the time from the beginning of time period T2 up to the moment when the UE initiates the SLSS transmission.

The SLSS transmission initiation delay shall be less than 0.8 s.

The SLSS transmission cease delay is defined as the time from the beginning of time period T3 up to the moment when the UE ceases the SLSS transmission.

The SLSS transmission cease delay shall be less than 0.8 s.

The rate of correct initiation/cease delay of SLSS transmissions observed during repeated tests shall be at least 90%.

NOTE: The initiation/cease delay of SLSS transmissions can be expressed as: $T_{evaluate,SLSS}$ + SLSS period,

Where:

$T_{evaluate,SLSS}$ is the evaluation time for initiate/cease of SLSS, and is 0.64 sec (clause 13.3.1.3) for the parameters in this test;

SLSS period is set as 160ms in this test.

# A.12.3 V2X Synchronization Reference Selection/Reselection Tests

## A.12.3.1 V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority

### A.12.3.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection defined in clause 13.4, when GNSS is configured as the highest priority. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.12.3.1.1-1and A.12.3.1.1-2 below. There are no GNSS signals in this test. There are one active cell (PCell) and two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test. The test system shall emulate SyncRef UE 1 and SyncRef UE 2 to transmit SLSS and MIB-SL every SLSS period.

The test system can verify the selection / reselection of SyncRef UE by monitoring the SLSS ID used by the V2X UE for its SLSS+MIB-SL transmissions. When the V2X UE is not synchronized to any SyncRef UE, then the V2X UE shall use the SLSS ID pre-configured in the V2X UE. When the V2X UE is synchronized to a SyncRef UE, the V2X UE shall derive its SLSS ID from the SLSS ID of the SyncRef UE as per clause 5.10.7.3 of TS 36.331.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select PCell as synchronization source. During T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source. During T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.

**Table A.12.3.1.1-1: Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active synchronization source | | Cell 1 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as TRUE in MIB-SL. |
| T2 end condition | Active synchronization source | | Sync Ref UE 1 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 168 and in-coverage set as FALSE in MIB-SL. |
| Final condition | Active synchronization source | | Sync Ref UE 2 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 0 and in-coverage set as FALSE in MIB-SL. |
| Active SyncRef UEs | | | SyncRef UE 1<br>SyncRef UE 2 | Transmitting SLSS+MIB-SL on RF channel number 1 (TDD carrier in Band 47) |
| Active cell | | | Cell 1 | E-UTRA FDD Cell 1 on RF channel number 2 |
| Timing offset between SyncRef UE 1 and SyncRef UE 2 | | μs | 3 | Synchronous |
| Frequency offset of SyncRef UE 1 | | ppm | 0 | |
| Frequency offset of SyncRef UE 2 | | ppm | 0 | |

| V2X sidelink Communication configuration | | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
|---|---|---|---|
| typeTxSync | | *gnss* | |
| slssid | | *30* | |
| syncTxThreshIC | | +infinity | |
| T1 | s | 24 | |
| T2 | s | 16 | |
| T3 | s | 3.2 | |

**Table A.12.3.1.1-2: SyncRef UE Specific Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority**

| Parameter | Unit | SyncRef UE 1 | | | SyncRef UE 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ Note 4 | MHz | 5 or 10 | | | | | |
| V2X Sidelink Communication resource pool configuration | | As specified in Table A.3.24.2-1 (Configuration #1) | | | As specified in Table A.3.24.2-2 (Configuration #2) | | |
| networkControlledSyncTx | | N/A | | | ON | | |
| syncTxThreshOoC | dBm/15 kHz | +infinity | | | N/A | | |
| slssid | | 0 | | | 0 | | |
| inCoverage (in MIB-SL) | | FALSE | | | TRUE | | |
| syncOffsetIndicator | | syncOffsetIndicator2 | | | syncOffsetIndicator1 | | |
| $N_{oc}$ Note1 | dBm/15 kHz | -95 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 0 | 0 | -infinity | -infinity | 3 |
| $\hat{E}_s / I_{ot}$ | dB | -infinity | 0 | 0 | -infinity | -infinity | 3 |
| S-RSRP Note2, Note 3 | dBm/15 kHz | -infinity | -95 | -95 | -infinity | -infinity | -92 |
| Propagation Condition | | AWGN | | | | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

**Table A.12.3.1.1-3: Cell Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for GNSS configured as the highest priority**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 2 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.2 | | OP.2 FDD | | |
| PBCH_RA | dB | 0 | | |
| PBCH_RB | | | | |
| PSS_RA | | | | |
| SSS_RA | | | | |
| PCFICH_RB | | | | |
| PHICH_RA | | | | |
| PHICH_RB | | | | |
| PDCCH_RA | | | | |
| PDCCH_RB | | | | |
| PDSCH_RA | | | | |
| PDSCH_RB | | | | |
| OCNG_RA Note 1 | | | | |

| | | | | |
|---|---|---|---|---|
| OCNG_RB Note 1 | | | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | 4.5 | 4.5 |
| RSRP Note3 | dBm/15 kHz | -90.5 | -90.5 | -90.5 |
| SCH_RP Note 3 | dBm/15 kHz | -90.5 | -90.5 | -90.5 |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.12.3.1.2 Test Requirements

1) During T2, SyncRef UE selection delay is defined as the time from the beginning of T2 to the time UE is synchronized to SyncRef UE 1 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 168 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T2.

The SyncRef UE selection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 13.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 13.3.1.3)
- SLSS period = 160ms

This gives a total of 8.8seconds.

2) During T3, SyncRef UE reselection delay is defined as the time from the beginning of T3 to the time UE changes its synchronization source from SyncRef UE 1 to SyncRef UE 2, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 2 as the synchronization source. For the test configuration, the SLSS ID will still be 0 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE reselection delay shall be less than 2.4sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 1.6sec (as specified in sub-clause 13.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 13.3.1.3)
- SLSS period = 160ms

This gives a total of 2.4seconds.

The test system will verify that the V2X UE does not drop or delay more than 6% of its V2X data and SLSS transmissions during the duration of T2, and does not drop or delay more than 30% of its SLSS transmissions during the duration of T3.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

# A.12.3.2 V2X Synchronization Reference Selection/Reselection Tests for eNB configured as the highest priority

## A.12.3.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection defined in clause 13.4, when eNB is configured as the highest priority. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.12.3.2.1-1and A.12.3.2.1-2 below. There are no active cells and GNSS is reliable during the whole test. The test system can emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in B.6.1. There are two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test. The test system shall emulate SyncRef UE 1 and SyncRef UE 2 to transmit SLSS and MIB-SL every SLSS period.

The test system can verify the selection / reselection of SyncRef UE by monitoring the SLSS ID used by the V2X UE for its SLSS+MIB-SL transmissions. When the V2X UE is not synchronized to any SyncRef UE, then the V2X UE shall use the SLSS ID pre-configured in the V2X UE. When the V2X UE is synchronized to a SyncRef UE, the V2X UE shall derive its SLSS ID from the SLSS ID of the SyncRef UE as per clause 5.10.7.3 of TS 36.331.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source. During T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source. During T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.

**Table A.12.3.2.1-1: Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for eNB configured as the highest priority**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active synchronization source | | GNSS | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 0 and in-coverage set as TRUE in MIB-SL. |
| T2 end condition | Active synchronization source | | Sync Ref UE 1 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 168+59 and in-coverage set as FALSE in MIB-SL. |
| Final condition | Active synchronization source | | Sync Ref UE 2 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as FALSE in MIB-SL. |
| Active cell | | | None | |
| Active SyncRef UEs | | | SyncRef UE 1<br>SyncRef UE 2 | Transmitting SLSS+MIB-SL on RF channel number 1 |
| Timing offset between SyncRef UE 1 and SyncRef UE 2 | | ms | 3 | Asynchronous |
| Frequency offset of SyncRef UE 1 | | ppm | 0 | |
| Frequency offset of SyncRef UE 2 | | ppm | 5 | |
| V2X sidelink Communication preconfiguration | | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| syncPriority | | | *enb* | |
| syncTxThreshOoC | | | 11 (+infinity) | |
| T1 | | s | 24 | |
| T2 | | s | 16 | |
| T3 | | s | 16 | |

**Table A.12.3.2.1-2: SyncRef UE Specific Test Parameters for V2X Synchronization Reference Selection/Reselection Tests for eNB configured as the highest priority**

| Parameter | Unit | SyncRef UE 1 | | | SyncRef UE 2 | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T1 | T2 | T3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | | | | |
| $BW_{channel}$ | MHz | 5 or 10 | | | | | |
| V2X Sidelink Communication resource pool configuration | | As specified in Table A.3.24.2-1 (Configuration #1) | | | As specified in Table A.3.24.2-2 (Configuration #2) | | |
| networkControlledSyncTx | | N/A | | | ON | | |
| syncTxThreshOoC | dBm/15 kHz | +infinity | | | N/A | | |
| slssid | | 59 | | | 30 | | |
| inCoverage (in MIB-SL) | | FALSE | | | TRUE | | |
| syncOffsetIndicator | | syncOffsetIndicator2 | | | syncOffsetIndicator1 | | |
| $N_{oc}$ Note1 | dBm/15 kHz | -95 | | | | | |
| $\hat{E}_s / N_{oc}$ | dB | -infinity | 0 | 0 | -infinity | -infinity | 3 |
| $\hat{E}_s / I_{ot}$ | dB | -infinity | 0 | 0 | -infinity | -infinity | 3 |
| S-RSRP Note2, Note 3 | dBm/15 kHz | -infinity | -95 | -95 | -infinity | -infinity | -92 |
| Propagation Condition | | AWGN | | | | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

### A.12.3.1.2 Test Requirements

1) During T2, SyncRef UE selection delay is defined as the time from the beginning of T2 to the time UE is synchronized to SyncRef UE 1 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 168+59 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T2.

The SyncRef UE selection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 11.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 13.3.1.3)
- SLSS period = 160ms

This gives a total of 8.8 seconds.

2) During T3, SyncRef UE reselection delay is defined as the time from the beginning of T3 to the time UE changes its synchronization source from SyncRef UE 1 to SyncRef UE 2, and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 2 as the synchronization source. For the test configuration, the SLSS ID will be changed o 30 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE reselection delay shall be less than 8.8sec. The SyncRef UE selection/reselection delay can be expressed as:

SyncRef UE selection/reselection delay = $T_{detect,SyncRef\ UE}$ + $T_{evaluate,SLSS}$ + SLSS period

Where

- $T_{detect,SyncRef\ UE}$ = 8sec (as specified in sub-clause 11.4)
- $T_{evaluate,SLSS}$ = 0.64 (as specified in sub-clause 13.3.1.3)
- SLSS period = 160ms

This gives a total of 8.8 seconds.

The test system will verify that the V2X UE does not drop or delay more than 6% of its V2X data and SLSS transmissions during the duration of T2 and T3.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

# A.12.4 Congestion Control Measurement Test for V2X UE

## A.12.4.1 Test Purpose and Environment

The purpose of this test is to verify that the V2X UE makes correct reporting of an event. This test will verify the congestion control measurement requirements in section 13.6.

The test parameters are given in Table A.12.4.1-1 and A.12.4.1-2 below. In the measurement control information it is indicated to the V2X UE that event-triggered reporting with Event V1 is used. There are 4 active sidelink UEs in this test. The test system shall emulate the active sidelink UE to transmit PSCCH/PSSCH every 100ms. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During T1, all of active sidelink UEs are powered off. During T2, all of active sidelink UEs are powered on and transmit PSCCH/PSSCH every 100ms.

**Table A.12.4.1-1: General test parameters for Congestion Control Measurement Test for V2X UE**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| V2X sidelink communication configuration | | | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| sl-Subframe-r14 included in SL-configV2X-TxPoolList | | | 11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111<br>11111111111111111111 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| numSubchannel-r14 included in SL-configV2X-TxPoolList | | | 1 | ENUMERATED {n1} |
| *threshS-RSSI-CBR* | | | 21 | Corresponding -70dBm as defined in Section 6.3.8 in TS36.331 |
| Number of Active Sidelink UEs every 100ms | | | 4 | Active Sidelink UE i, where i = 0, 1, 2, 3 |
| Active Sidelink UEs | V2X sidelink Communication configuration | | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| | sl-Subframe-r14 included in SL-configV2X-TxPoolList | | 10000000000000000000<br>00000000000000000000<br>00000000000000000000<br>00000000000000000000<br>00000000000000000000 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| | numSubchannel-r14 included in SL-configV2X-TxPoolList | | 1 | ENUMERATED {n1} |
| | sl-OffsetIndicator-r14 | | i | For Active Sidelink UE i, where i = 0, 1, 2, 3 |
| Timing offset between V2X UE and Active Sidelink UEs | | µs | 3 | Synchronous |
| v1-Threshold | | | 2 | Corresponding 0.02 as defined in Section 6.3.8 in TS36.331 |
| Hysteresis | | | 0 | |
| Time To Trigger | | s | 0 | |
| Filter coefficient | | | 0 | L3 filtering is not used |
| T1 | | s | 5 | |
| T2 | | s | 5 | |

**Table A.12.4.1-2: Active sidelink UE specific test parameters for Congestion Control Measurement Test for V2X UE**

| Parameter | Unit | Active Sidelink UE *i* (*i* = 0, 1, 2, 3) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PSCCH RMC (defined in A.3.24.3) | | CC.1A TDD | |
| PSSCH RMC (defined in A.3.24.3) | | CD.1A TDD | |
| $N_{oc}$ Note1 | dBm/15 KHz | -106 | |
| PSCCH $\hat{E}_s/N_{oc}$ | dB | 7.19 | 13.19 |
| PSSCH $\hat{E}_s/N_{oc}$ | dB | 4.19 | 10.19 |
| PSSCH-RSRP Note 2 | dBm/15 KHz | -101.81 | -95.81 |
| S-RSSI1 Note 2 Note3 | dBm/9 MHz | -72.5 | -67.5 |
| S-RSSI2 Note 2 Note4 | dBm/9 MHz | -78.22 | -78.22 |
| Io1 Note 2 Note4 | dBm/9 MHz | -72.5 | -67.5 |
| Io2 Note 2 Note6 | dBm/9 MHz | -78.22 | -78.22 |
| Propagation Condition | - | AWGN | |

Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: PSSCH $E_s/N_{oc}$, PSSCH-RSRP, S-RSSI1, S-RSSI2, Io1 and Io2 levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: S-RSSI1 is the S-RSSI level measured on the subframe# 0 - 3 with “SFN mod 10 = 0”.

Note 4: S-RSSI2 is the S-RSSI level measured on the subframe# 4-9 with “SFN mod 10 = 0” and the subframe# 0-9 with “SFN mod 10 = 1,…, 9”.

Note 5: Io1 is the Io level measured on the subframe# 0 - 3 with “SFN mod 10 = 0”.

Note 6: Io2 is the Io level measured on the subframe# 4-9 with “SFN mod 10 = 0” and the subframe# 0-9 with “SFN mod 10 = 1,…, 9”.

## A.12.4.2 Test Requirements

The UE shall not send event V1 triggered measurement reports during T1 and shall send event V1 triggered measurement reports during T2.

The rate of correct events observed during repeated tests shall be at least 98%.

# A.12.5 Interruptions due to V2X Sidelink Communication

## A.12.5.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to V2X sidelink communication defined in clause 13.7.1 under the following additional conditions:

- The UE is out of coverage on the V2X sidelink carrier and is associated with a serving cell on a non-V2X sidelink carrier

This test is applicable for V2X sidelink communication capable UEs that support concurrent inter-band E-UTRAN and V2X sidelink operation.

For this test, the UE is triggered by the test loop function or the upper layers to monitor V2X sidelink communication.

The test parameters are given in Table A.12.5.1-1, Table A.12.5.1-2, and Table A.12.5.1-3. The test consists of one active cell (PCell) on the serving RF channel 1, and there are no active cells on RF channel 2. On RF channel 2, the test consists of 8 active Sidelink UEs in this test transmitting V2X sidelink communication.

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively.

During T1, the UE is in RRC_IDLE and monitoring the V2X sidelink communication transmission from other active Sidelink UEs on the V2X sidelink communication resoruces.

During T2, the test system establishes a RRC connection with the UE. No PDSCH traffic is scheduled for UE during T2, and the UE is expected to transmit *SidelinkUEInformation* indicating *v2x-CommRxInterestedFreqList* during T2. On reception of *SidelinkUEInformation*, the test system shall send RRC reconfiguration message to the UE and wait for the UE to repond with RRC reconfiguration complete message before transitioning to T3. If the UE does not transmit *SidelinkUEInformation* for up to 2 second, the test system shall transition to T3.

During T3, the UE is scheduled with PDSCH traffic on PCell downlink. The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during V2X sidelink communication (no missed ACK/NACKs are allowed).

**Table A.12.5.1-1: Test Parameters for Interruptions due to V2X Sidelink Communication**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 1, 2 | RF channel 1 is non-V2X sidelink carrier<br>RF channel 2 is V2X sidelink carrier |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | - | Cell 1 | PCell on RF channel number 1 |
| CP length of Cell 1 | - | Normal | |
| T1 | s | 5.12 | |
| T2 | s | Up to receiving RRC reconfiguration setup complete from the UE, or up to 2 second if UE does not transmit *SidelinkUEInformation* during this period. | |
| T3 | s | 10 | |

**Table A.12.5.1-2: Slidelink Communication Configuration for Interruptions due to V2X Sidelink Communication**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | - | 2 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| V2X sidelink Communication configuration | | - | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| Number of Active Sidelink UEs per sc-period | | - | 8 | Sidelink UE i = 0, .., 7 |
| Active Sidelink UEs | V2X sidelink Communication configuration | - | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| | PSCCH Reference Measurement Channel | - | CC.1A TDD | As specified in Table A.3.24.3.1-1 |
| | PSSCH Reference Measurement Channel | - | CD.1A TDD | As specified in Table A.3.24.3.1-2 |
| | numSubchannel-r14 included in v2x-CommTxPoolNormal-r14 | - | 1 | ENUMERATED {n1} |
| | startRB-Subchannel-r14 included in v2x-CommTxPoolNormal-r14 | - | i | For Sidelink UE i = 0, .., 7 |
| | RSRP | dBm/15kHz | -98 | |

**Table A.12.5.1-3: Cell specific test parameters for interruptions due to V2X slidelink communication**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | - | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| UE RRC state | - | IDLE | CONNECTED | |

| | | | | | |
|---|---|---|---|---|---|
| Paging configuration | defaultPagingCycle | - | rf256 | N/A | |
| | nB | - | T/32 | | |
| DRX | | - | N/A | OFF | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 Note1, Note 4 | | - | N/A | None | R.3 FDD |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 Note1 | | - | R.6 FDD | | |
| OCNG Pattern | | - | OP.6 FDD | | OP.10 FDD |
| PBCH_RA | | dB | 0 | | |
| PBCH_RB | | | | | |
| PSS_RA | | | | | |
| SSS_RA | | | | | |
| PCFICH_RB | | | | | |
| PHICH_RA | | | | | |
| PHICH_RB | | | | | |
| PDCCH_RA | | | | | |
| PDCCH_RB | | | | | |
| PDSCH_RA | | | | | |
| PDSCH_RB | | | | | |
| OCNG_RA Note 1 | | | | | |
| OCNG_RB Note 1 | | | | | |
| $N_{oc}$ Note2 | | dBm/15 kHz | -98 | | |
| $\hat{E}_s / N_{oc}$ | | dB | 16 | | |
| RSRP Note3 | | dBm/15 kHz | -82 | | |
| SCH_RP Note 3 | | dBm/15 kHz | -82 | | |
| Propagation Condition | | - | AWGN | | |
| Correlation Matrix and Antenna Configuration | | - | 1x2 Low | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.12.5.2 Test Requirements

The UE shall be continuously scheduled on PCell on RF channel 1 during T3. During T3, 100% of all expected ACK/NACKs shall be transmitted by the V2X UE.

## A.12.6 V2X UE Autonomous Resource Selection/Reselection Measurement Test

### A.12.6.1 V2X UE Autonomous Resource Selection/Reselection Tests for PSSCH-RSRP measurements

#### A.12.6.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to autonomous resource selection / reselection for V2X UE in mode 4 defined in clause 13.5. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.12.6.1.1-1and A.12.6.1.1-2 below. There are 20 active V2X sidelink UEs in this test. Both the UE under test and active V2X sidelink UEs select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs. The test parameters for GNSS signals are defined in B.6.1. The test system shall emulate the active V2X sidelink UEs to transmit PSCCH/PSSCH every 20ms. At the beginning of whole test, the test equipment shall send one message with a SL-SCH MAC PDU as specified in Clause 6.1.6 in TS 36.321, in order to make sure that the UE under test needs continuously transmit PSCCH/PSSCH.

The test consists of two duration T1 and T2. During T1, the signal from Test Equipement are configured such that the measured PSSCH-RSRP is above the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to be excluded in the resource selection procedure. During T2, the signal from Test Equipement are configured such that the measured PSSCH-RSRP is below the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to included in the resource selection procedure.

**Table A.12.6.1.1-1: Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for PSSCH-RSRP measurements**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | | 1 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | | MHz | 10 | |
| V2X sidelink communication pre-configuration | | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | | | 1111111111111111111 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| numSubchannel-r14 included in SL-PreconfigV2X-TxPoolList | | | 5 | Indicates the number of sub-channels for TX resource pool |
| minSubChannel-NumberPSSCH-r14 included in v2x-ResourceSelectionConfig-r14 | | | 1 | Indicates the minimum number of sub-channels which may be used for transmissions on PSSCH |
| maxSubchannel-NumberPSSCH-r14 included in v2x-ResourceSelectionConfig-r14 | | | 1 | Indicates the maximum number of sub-channels which may be used for transmissions on PSSCH |
| Number of Active Sidelink UEs | | | 20 | Active Sidelink UE i = 0, .., 19 |
| *SL-ThresPSSCH-RSRP* | | | 12 | Corresponding -106 dBm as defined in Section 6.3.8 in TS36.331 |
| Active Sidelink UEs | V2X sidelink Communication preconfiguration | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| | sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | | 10000000000000000000 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| | numSubchannel-r14 included in SL-PreconfigV2X-TxPoolList | | 1 | Indicates the number of sub-channels for TX resource pool |
| | startRB-Subchannel-r14 included in SL-PreconfigV2X-TxPoolList | | 5 | Indicates the lowest RB index of the subchannel with the lowest index. |
| | startRB-PSCCH-Pool-r14 included in SL-PreconfigV2X-TxPoolList | | 5 | Indicates the lowest RB index of the PSCCH pool. |
| | sl-OffsetIndicator-r14 | | i mod 20 | For Active Sidelink UE i, where i = 0, .., 19 |
| Timing offset among Active Sidelink UEs | | μs | ≤3 | Synchronous |

**Table A.12.6.1.1-2: Active Sidelink UE Specific Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for PSSCH-RSRP measurements**

| Parameter | Unit | Active Sidelink UE i (i = 0, .., 19) | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | - | 1 | |
| $BW_{channel}$ Note 4 | MHz | 10 | |
| PSCCH RMC (defined in A.3.24.3) | - | CC.1A HD | |

| | | | |
|---|---|---|---|
| PSSCH RMC (defined in A.3.24.3) | - | CD.1B HD | |
| OCNG pattern defined in A.3.2.4 | - | VOP.1 HD | |
| $N_{oc}$ Note1 | dBm/15 kHz | -103 | -113 |
| PSCCH $\hat{E}_s/N_{oc}$ | dB | 5 | |
| PSSCH $\hat{E}_s/N_{oc}$ | dB | 2 | |
| PSCCH $\hat{E}_s/I_{ot}$ Note2 | dB | 5 | |
| PSSCH $\hat{E}_s/I_{ot}$ Note2 | dB | 2 | |
| S-RSRP Note 2 | dB | -101 | -111 |
| S-RSSI1 Note 2 Note3 | dBm/0.9 MHz | -80.15 | -90.15 |
| S-RSSI2 Note 2 Note4 | dBm/0.9 MHz | -80.15 | -90.15 |
| S-RSSI3 Note 2 Note5 | dBm/0.9 MHz | -65.18 | -75.18 |
| Antenna Configuration | - | 1x2 | |
| Propagation Condition | - | AWGN | |

Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: Es/Iot, S-RSRP and S-RSSI levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: S-RSSI1 is the S-RSSI level measured on subchannel #1.

Note 4: S-RSSI2 is the S-RSSI level measured on subchannel #3.

Note 5: S-RSSI3 is the S-RSSI level measured on subchannel #0/2/4.

### A.12.6.1.2 Test Requirements

The test time T1 and T2 should be long enough. The rate of PSSCH transmissions on the resources on subchannel #1 or #3 shall be less than 10% during T1. The rate of PSSCH transmissions on the resources on subchannel #1 or #3 shall be more than 90% during T2.

## A.12.6.2 V2X UE Autonomous Resource Selection/Reselection Tests for S-RSSI measurements

### A.12.6.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to autonomous resource selection / reselection for V2X UE in mode 4 defined in clause 13.5. For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X Sidelink Communication.

The test parameters are given in Table A.12.6.2.1-1and A.12.6.2.1-2 below. There are 20 active V2X sidelink UEs in this test. Both the UE under test and active V2X sidelink UEs select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs. The test parameters for GNSS signals are defined in B.6.1. The test system shall emulate the active sidelink UE to transmit PSCCH/PSSCH every 20ms. At the beginning of whole test, the test equipment shall send one message with a SL-SCH MAC PDU as specified in Clause 6.1.6 in TS 36.321, in order to make sure that the UE under test needs continuely transmit PSCCH/PSSCH.

**Table A.12.6.2.1-1: Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for S-RSSI measurements**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| V2X sidelink communication pre-configuration | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |

| | | | | |
|---|---|---|---|---|
| sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | | | 1111111111111111111 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| numSubchannel-r14 included in SL-PreconfigV2X-TxPoolList | | | 5 | Indicates the number of sub-channels for TX resource pool |
| minSubChannel-NumberPSSCH-r14 included in v2x-ResourceSelectionConfig-r14 | | | 1 | Indicates the minimum number of sub-channels which may be used for transmissions on PSSCH |
| maxSubchannel-NumberPSSCH-r14 included in v2x-ResourceSelectionConfig-r14 | | | 1 | Indicates the maximum number of sub-channels which may be used for transmissions on PSSCH |
| Number of Active Sidelink UEs | | | 20 | Sidelink UE i = 0, .., 19 |
| *SL-ThresPSSCH-RSRP* | | | 66 | Corresponding infinity dBm as defined in Section 6.3.8 in TS36.331 |
| Active Sidelink UEs | V2X sidelink communication preconfiguration | | As specified in Table A.3.24.2-1 (Configuration #1) | IE values unless specified otherwise in this test. |
| | sl-Subframe-r14 included in SL-PreconfigV2X-TxPoolList | | 10000000000000000000 | Indicates the bitmap of the TX resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]) |
| | numSubchannel-r14 included in SL-PreconfigV2X-TxPoolList | | 1 | Indicates the number of sub-channels for TX resource pool |
| | startRB-Subchannel-r14 included in SL-PreconfigV2X-TxPoolList | | 5 | Indicates the lowest RB index of the subchannel with the lowest index. |
| | startRB-PSCCH-Pool-r14 included in SL-PreconfigV2X-TxPoolList | | 5 | Indicates the lowest RB index of the PSCCH pool. |
| | sl-OffsetIndicator-r14 | | i mod 20 | For Sidelink UE i, where i = 0, .., 19 |
| Timing offset among Active Sidelink UEs | | μs | ≤3 | Synchronous |

**Table A.12.6.2.1-2: Active Sidelink UE Specific Test Parameters for V2X UE Autonomous Resource Selection/Reselection Tests for S-RSSI measurements**

| Parameter | Unit | Active Sidelink UE i (i = 0, .., 19) |
|---|---|---|
| E-UTRA RF Channel Number | - | 1 |
| $BW_{channel}$ Note 4 | MHz | 10 |
| PSCCH RMC (defined in A.3.24.3) | - | CC.1A HD |
| PSSCH RMC (defined in A.3.24.3) | - | CD.1B HD |
| OCNG pattern defined in A.3.2.4 | - | VOP.2 TDD |
| $N_{oc}$ Note1 | dBm/15 kHz | -105 |
| PSCCH $\hat{E}_s / N_{oc}$ | dB | 5 |
| PSSCH $\hat{E}_s / N_{oc}$ | dB | 2 |
| PSCCH $\hat{E}_s / I_{ot}$ Note2 | dB | 5 |
| PSSCH $\hat{E}_s / I_{ot}$ Note2 | dB | 2 |
| S-RSRP Note 2 | dB | -103 |
| S-RSSI1 Note 2 Note3 | dBm/0.9 MHz | -82.15 |

| | | |
|---|---|---|
| S-RSSI2 Note 2 Note4 | dBm/0.9 MHz | -76.71 |
| S-RSSI3 Note 2 Note5 | dBm/0.9 MHz | -67.18 |
| Antenna Configuration | - | 1x2 |
| Propagation Condition | - | AWGN |

Note 1: Interference from other UEs and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 2: Es/Iot, S-RSRP and S-RSSI levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3: S-RSSI1 is the S-RSSI level measured on subchannel #1.
Note 4: S-RSSI2 is the S-RSSI level measured on subchannel #3.
Note 5: S-RSSI3 is the S-RSSI level measured on subchannel #0/2/4.

#### A.12.6.1.2 Test Requirements

The test shall be run for a long enough amount of time. The rate of PSSCH transmissions on the resources on subchannel #1 shall be more than 80%.

## A.12.7 V2X Synchronization Reference Selection/Reselection Tests for V2X Carrier Aggregation

### A.12.7.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to SyncRef UE selection / reselection defined in clause 13.10, when GNSS is configured as the highest priority.

The test parameters are given in Table A.12.7.1-1and A.12.7.1-2 below. GNSS is configured as the highest priority, and there are no GNSS signals in this test. There are one active cell (PCell) and one active SyncRef UE (SyncRef UE 1) in this test. The test system shall emulate SyncRef UE 1 to transmit SLSS and MIB-SL every SLSS period. SyncRef UE1 is operating on a PC5-based V2X channel (RF channel 1), and no active SyncRef UE is operating on another PC5-based V2X channel (RF channel 2). PCell is operating on an E-UTRAN channel (RF channel 3).

For this test, the UE is triggered by the test loop function or the upper layers to transmit for V2X sidelink communication both on RF channel 1 and on RF channel 2. RF channel 1 and on RF channel 2 are both included in *syncFreqList*.

The test system can verify the selection/reselection of SyncRef UE by monitoring the SLSS ID used by the V2X UE for its SLSS+MIB-SL transmissions. When the V2X UE is synchronized to a SyncRef UE, the V2X UE shall derive its SLSS ID from the SLSS ID of the selected SyncRef UE as defined in clause 5.10.7.3 of TS 36.331 [2].

The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. PCell is only powered on during T1. SyncRef UE 1 is only powered on during T3.

During T1, the V2X UE will select PCell as synchronization source. During T3, the V2X UE will select SyncRef UE 1 as the synchronization source and select RF channel 1 as synchronization carrier.

**Table A.12.7.1-1: Test Parameters for V2X Synchronization Reference Selection/Reselection Tests**

| Parameter | | Unit | Value | Comment |
|---|---|---|---|---|
| Initial condition | Active synchronization source | | Cell 1 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 30 and in-coverage set as TRUE in MIB-SL. |
| T3 end condition | Active synchronization source | | Sync Ref UE 1 | UE transmits for V2X Sidelink Communication and SLSS+MIB-SL with SLSS ID = 168 and in-coverage set as FALSE in MIB-SL. |
| Active SyncRef UEs | | | SyncRef UE 1 | Transmitting SLSS+MIB-SL on RF channel number 1 (TDD carrier in Band 47) |

| | | | |
|---|---|---|---|
| Active cell | | Cell 1 | E-UTRA FDD Cell 1 on RF channel number 3 |
| Timing offset between SyncRef UE 1 and Cell 1 | µs | 3 | Synchronous |
| Frequency offset of SyncRef UE 1 | ppm | 0 | |
| V2X sidelink Communication configuration | | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |
| typeTxSync | | *gnss* | |
| slssid | | *30* | |
| syncTxThreshIC | | +infinity | |
| T1 | s | 24 | |
| T2 | s | 0.8 | |
| T3 | s | 24 | |

**Table A.12.7.1-2: SyncRef UE 1 Test Parameters for V2X Synchronization Reference Selection/Reselection Tests**

| Parameter | Unit | T1 | T2 | T3 |
|---|---|---|---|---|
| E-UTRA RF Channel Number | | 1 | | |
| $BW_{channel}$ | MHz | 10 | | |
| V2X Sidelink Communication resource pool configuration | | As specified in Table A.3.24.2-1 (Configuration #1) | | |
| networkControlledSyncTx | | N/A | | |
| syncTxThreshOoC | dBm/ 15 kHz | +infinity | | |
| slssid | | 0 | | |
| inCoverage (in MIB-SL) | | FALSE | | |
| syncOffsetIndicator | | syncOffsetIndicator2 | | |
| $N_{oc}$ Note1 | dBm/ 15kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | -inf | -inf | 0 |
| $\hat{E}_s / I_{ot}$ Note 3 | dB | -inf | -inf | 0 |
| S-RSRP Note2, | dBm/ 15kHz | -inf | -inf | -95 |
| Propagation Condition | | AWGN | | |

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 2: S-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SSSS Es/Iot is set the same as PSSS/PSBCH Es/Iot.

**Table A.12.7.1-3: Cell Test Parameters for V2X Synchronization Reference Selection/Reselection Tests**

| Parameter | Unit | Cell 1 | | |
|---|---|---|---|---|
| | | T1 | T2 | T3 |
| E-UTRA RF Channel Number | | 3 | | |
| $BW_{channel}$ | MHz | 10 | | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | | R.6 FDD | | |
| OCNG Patterns defined in A.3.2.1.2 | | OP.2 FDD | | |

| | | | | |
|---|---|---|---|---|
| PBCH_RA<br>PBCH_RB<br>PSS_RA<br>SSS_RA<br>PCFICH_RB<br>PHICH_RA<br>PHICH_RB<br>PDCCH_RA<br>PDCCH_RB<br>PDSCH_RA<br>PDSCH_RB<br>OCNG_RA Note 1<br>OCNG_RB Note 1 | dB | 0 | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -95 | | |
| $\hat{E}_s / N_{oc}$ | dB | 4.5 | -inf | -inf |
| RSRP Note3 | dBm/15 kHz | -90.5 | -inf | -inf |
| SCH_RP Note 3 | dBm/15 kHz | -90.5 | -inf | -inf |
| Propagation Condition | | AWGN | | |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.12.7.2 Test Requirements

1) During T3, SyncRef UE selection delay is defined as the time from the beginning of T3 to the time UE is synchronized to SyncRef UE 1 and changes its SLSS transmissions timing and SLSS ID to follow SyncRef UE 1 as the synchronization source. For the test configuration, the SLSS ID will be changed to 168 (with in-coverage IE in MIB-SL set to FALSE) after SyncRef UE selection delay from start of T3.

The SyncRef UE selection delay shall be less than 17.44sec. The SyncRef UE selection/reselection delay can be expressed as:

$$\text{SyncRef UE selection/reselection delay} = T_{\text{detect,SyncRef UE}} + T_{\text{evaluate,SLSS}} + \text{SLSS period}$$

Where

- $T_{\text{detect,SyncRef UE}}$ = 16sec (as specified in subclause 13.10)
- $T_{\text{evaluate,SLSS}}$ = 1.28sec (as specified in subclause 13.10)
- SLSS period = 160ms

This gives a total of 17.44 seconds.

The test system will verify that the V2X UE does not drop or delay more than 6% of its V2X data and SLSS transmissions during the duration of T3, and does not drop or delay more than 30% of its SLSS transmissions during the duration of T3.

The rate of correct SyncRef UE selection / reselection observed during repeated tests shall be at least 90%.

# A.12.8 Interruptions due to V2X Carrier Aggregation

## A.12.8.1 Interruptions on a FDD PCell

### A.12.8.1.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to V2X carrier aggregation defined in clause 13.7.3, under the following additional conditions:

- The UE is out of coverage on the V2X sidelink carriers and is associated with the PCell on a non-V2X sidelink carrier

For this test, the UE is triggered by the test loop function or the upper layers to monitor and transmit V2X sidelink communication. There are three carriers, including two V2X sidelink carriers (CC2 and CC3) and one E-UTRAN carrier (CC1). Before the test starts the UE is connected to PCell on CC1. The UE uses PCell as synchronization reference for V2X sidelik communication and shall be continuously scheduled in the PCell throughout the whole test.

The test consists of two consecutive time periods, with time duration of T1 and T2, respectively.

At the beginning of T1, the UE receives an *RRCConnectionReconfiguration* message by which the UE is configured only to monitor and transmit V2X sidelik communication on CC2.

An *RRCConnectionReconfiguration* message including *sl-V2X-ConfigDedicated*, by which the UE is configured to monitor and transmit V2X sidelik communication on CC2 and CC3, is sent by the test equipment in subframe #*n*. The point in time at which the *sl-V2X-ConfigDedicated* message for adding CC3 for V2X sidelik communication is received at the UE antenna connector defines the start of time period T2.

During T2, the test system will count the missed ACK/NACKs during T2 to verify the allowed interruptions due to V2X CC addition/release.

The test parameters are given in Table A.12.8.1.1-1, Table A.12.8.1.1-2, and Table A.12.8.1.1-3.

**Table A.12.8.1.1-1: Test Parameters for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 1, 2, 3 | RF channel 1 is non-V2X sidelink carrier<br>RF channel 2 and 3 are V2X sidelink carrier |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | - | Cell 1 | PCell on RF channel number 1 |
| CP length of Cell 1 | - | Normal | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.12.8.1.1-2: Slidelink Communication Configuration for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 2, 3 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| V2X sidelink Communication configuration | - | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |

**Table A.12.8.1.1-3: Cell Specific Test Parameters for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | - | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| PDSCH Reference measurement channel defined in A.3.1.1.1 | | R.3 FDD | |

| | | |
|---|---|---|
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.1 | - | R.6 FDD |
| OCNG Pattern | - | OP.10 FDD |
| PBCH_RA | dB | 0 |
| PBCH_RB | | |
| PSS_RA | | |
| SSS_RA | | |
| PCFICH_RB | | |
| PHICH_RA | | |
| PHICH_RB | | |
| PDCCH_RA | | |
| PDCCH_RB | | |
| PDSCH_RA | | |
| PDSCH_RB | | |
| OCNG_RA Note 1 | | |
| OCNG_RB Note 1 | | |
| $N_{oc}$ Note2 | dBm/15 kHz | -98 |
| $\hat{E}_s / N_{oc}$ | dB | 16 |
| RSRP Note3 | dBm/15 kHz | -82 |
| SCH_RP Note 3 | dBm/15 kHz | -82 |
| Propagation Condition | - | AWGN |
| Correlation Matrix and Antenna Configuration | - | 1x2 Low |

Note 1: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.12.8.1.2 Test Requirements

During T2, an interruption on PCell shall occur no earlier than in subframe ($n$+5) and no later than in subframe ($n$ + 22), and the total number of missed ACK/NACKs is no more than 4. The ACK/NACK missing shall occur no earlier than in subframe ($n$+5) and no later than in subframe ($n$ +26).

All of the above test requirements shall be fulfilled in order for the observed CC3 addition delay and PCell interruptions to be counted as correct. The rate of correct observed CC3 addition delay and PCell interruptions during repeated tests shall be at least 90%.

## A.12.8.2 Interruptions on a TDD PCell

### A.12.8.2.1 Test Purpose and Environment

The purpose of this test is to verify the requirements related to interruptions due to V2X carrier aggregation defined in clause 13.7.3, under the following additional conditions:

- The UE is out of coverage on the V2X sidelink carriers and is associated with the PCell on a non-V2X sidelink carrier

For this test, the UE is triggered by the test loop function or the upper layers to monitor and transmit V2X sidelink communication. There are three carriers, including two V2X sidelink carriers (CC2 and CC3) and one E-UTRAN carrier (CC1). Before the test starts the UE is connected to PCell on CC1. The UE uses PCell as synchronization reference for V2X sidelik communication and shall be continuously scheduled in the PCell throughout the whole test.

The test consists of two consecutive time periods, with time duration of T1 and T2, respectively.

At the beginning of T1, the UE receives an *RRCConnectionReconfiguration* message by which the UE is configured only to monitor and transmit V2X sidelik communication on CC2.

An *RRCConnectionReconfiguration* message including *sl-V2X-ConfigDedicated*, by which the UE is configured to monitor and transmit V2X sidelik communication on CC2 and CC3, is sent by the test equipment in subframe #*n*. The point in time at which the *sl-V2X-ConfigDedicated* message for adding CC3 for V2X sidelik communication is received at the UE antenna connector defines the start of time period T2.

During T2, the test system will count the missed ACK/NACKs during T2 to verify the allowed interruptions due to V2X CC addition/release.

The test parameters are given in Table A.12.8.2.1-1, Table A.12.8.2.1-2, and Table A.12.8.2.1-3.

**Table A.12.8.2.1-1: Test Parameters for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 1, 2, 3 | RF channel 1 is non-V2X sidelink carrier<br>RF channel 2 and 3 are V2X sidelink carrier |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| Active cell | - | Cell 1 | PCell on RF channel number 1 |
| CP length of Cell 1 | - | Normal | |
| T1 | s | 5 | |
| T2 | s | 5 | |

**Table A.12.8.2.1-2: Slidelink Communication Configuration for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Value | Comment |
|---|---|---|---|
| E-UTRA RF Channel Number | - | 2, 3 | TDD carrier in Band 47 |
| Channel Bandwidth ($BW_{channel}$) | MHz | 10 | |
| V2X sidelink Communication configuration | - | As specified in Table A.3.24.2-2 (Configuration #2) | IE values unless specified otherwise in this test. |

**Table A.12.8.2.1-3: Cell Specific Test Parameters for Interruptions due to V2X Carrier Aggregation**

| Parameter | Unit | Cell 1 | |
|---|---|---|---|
| | | T1 | T2 |
| E-UTRA RF Channel Number | - | 1 | |
| $BW_{channel}$ | MHz | 10 | |
| Special subframe configuration[Note1] | | 6 | |
| Uplink/downlink configuration[Note1] | | 1 | |
| PDSCH Reference measurement channel defined in A.3.1.1.2 | | R.0 TDD | |
| PDCCH/PCFICH/PHICH Reference measurement channel defined in A.3.1.2.2 | - | R.6 TDD | |
| OCNG Pattern | - | OP.1 TDD | |
| PBCH_RA | dB | 0 | |
| PBCH_RB | | | |
| PSS_RA | | | |
| SSS_RA | | | |
| PCFICH_RB | | | |
| PHICH_RA | | | |
| PHICH_RB | | | |
| PDCCH_RA | | | |
| PDCCH_RB | | | |
| PDSCH_RA | | | |
| PDSCH_RB | | | |
| OCNG_RA[Note 2] | | | |
| OCNG_RB[Note 2] | | | |
| $N_{oc}$ [Note3] | dBm/15 kHz | -98 | |
| $\hat{E}_s / N_{oc}$ | dB | 16 | |
| RSRP [Note4] | dBm/15 kHz | -82 | |

| | | |
|---|---|---|
| SCH_RP Note 4 | dBm/15 kHz | -82 |
| Propagation Condition | - | AWGN |
| Correlation Matrix and Antenna Configuration | - | 1x2 Low |

Note 1: For special subframe and uplink-downlink configurations see Tables 4.2-1 and 4.2-2 in TS 36.211 [16].
Note 2: OCNG shall be used such that cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 3: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 4: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

### A.12.8.2.2 Test Requirements

During T2, an interruption on PCell shall occur no earlier than in subframe ($n$+5) and no later than in subframe ($n$ + 22), and the total number of missed ACK/NACKs is no more than 2. The ACK/NACK missing shall occur no earlier than in subframe ($n$+5) and no later than in subframe ($n$ +29).

All of the above test requirements shall be fulfilled in order for the observed CC3 addition delay and PCell interruptions to be counted as correct. The rate of correct observed CC3 addition delay and PCell interruptions during repeated tests shall be at least 90%.

# Annex B (normative): Conditions for RRM requirements applicability for operating bands

## B.1 Conditions for E-UTRAN RRC_IDLE state mobility

### B.1.1 Conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection

This clause defines the E-UTRAN intra-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.1-1.

**Table B.1.1-1: Conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -124 | -124 | ≥ -4 | ≥ -4 |
| | FDD_B1, FDD_B2 | -123.5 | -123.5 | | |
| | FDD_C, TDD_C | -123 | -123 | | |
| | FDD_D | -122.5 | -122.5 | | |
| | FDD_E, TDD_E | -122 | -122 | | |
| | FDD_F | -121.5 Note 2 | -121.5 Note 2 | | |
| | FDD_G | -121 | -121 | | |
| | FDD_H | -120.5 | -120.5 | | |
| | FDD_N | -117.5 | -117.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Section B.4.2.
NOTE 2: The condition is -122 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### B.1.2 Conditions for measurements of inter-frequency E-UTRAN cells for cell re-selection

This clause defines the E-UTRAN inter-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection defined in Table B.1.1-1 also apply for inter-frequency E-UTRAN cells in this section.

### B.1.3 Conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection for UE Category M1

This clause defines the E-UTRAN intra-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.1.3 is defined in Section 3.1.

The conditions for normal coverage measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.3-1 and for E-UTRAN HD-FDD are defined are defined in Table B.1.3-2.

The conditions for enhanced coverage measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.3-3 and for E-UTRAN HD-FDD are defined are defined in Table B.1.3-4.

**Table B.1.3-1: E-UTRAN intra-frequency measurements for FDD and TDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -125 | -125 | ≥ -6 | ≥ -6 |
| | FDD-M1_B | -123.5 | -123.5 | | |
| | FDD-M1_D | -123.5 | -123.5 | | |
| | FDD-M1_E, TDD-M1_E | -123 | -123 | | |
| | FDD-M1_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD-M1_G | -122 | -122 | | |
| | FDD-M1_N | -118.5 | -118.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.3-2: E-UTRAN intra-frequency measurements for HD-FDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD-M1_A | -125 | -125 | ≥ -6 | ≥ -6 |
| | FDD-M1_B | -123.5 | -123.5 | | |
| | FDD-M1_D | -123.5 | -123.5 | | |
| | FDD-M1_E | -123 | -123 | | |
| | FDD-M1_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD-M1_G | -122 | -122 | | |
| | FDD-M1_N | -118.5 | -118.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.3-3: E-UTRAN intra-frequency measurements for FDD and TDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -135 | -135 | ≥ -15 | ≥ -15 |
| | FDD-M1_B | -123.5 | -123.5 | | |
| | FDD-M1_D | -133.5 | -133.5 | | |
| | FDD-M1_E TDD-M1_E | -133 | -133 | | |
| | FDD-M1_F | -132.5 Note 2 | -132.5 Note 2 | | |
| | FDD-M1_G | -132 | -132 | | |
| | FDD-M1_N | -128.5 | -128.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.3-4: E-UTRAN intra-frequency measurements for HD-FDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD-M1_A | -135 | -135 | ≥ -15 | ≥ -15 |
| | FDD-M1_B | -123.5 | -123.5 | | |
| | FDD-M1_D | -133.5 | -133.5 | | |
| | FDD-M1_E | -133 | -133 | | |
| | FDD-M1_F | -132.5 Note 2 | -132.5 Note 2 | | |
| | FDD-M1_G | -132 | -132 | | |

| | | | | | |
|---|---|---|---|---|---|
| | FDD-M1_N | -128.5 | -128.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2. | | | | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## B.1.4 Conditions for measurements of intra-frequency NB-IoT cells for cell re-selection for UE Category NB1

This clause defines the NB-IoT intra-frequency NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.1.4 is defined in Section 3.6.

The conditions for measurements of intra-frequency NB-IoT cells in normal coverage for cell re-selection are defined in Table B.1.4-1 and B.1.4-3.

The conditions for measurements of intra-frequency NB-IoT cells in enhanced coverage for cell re-selection are defined in Table B.1.4-2 and B.1.4-4.

**Table B.1.4-1: NB-IoT intra-frequency measurements for HD-FDD in normal coverage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NRSRP | Minimum NSCH_RP | NRS Ês/Iot | NSCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | NFDD_G | -129 | -129 | ≥ -6 | ≥ -6 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | |

**Table B.1.4-2: NB-IoT intra-frequency measurements for HD-FDD in enhanced coverage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NRSRP | Minimum NSCH_RP | NRS Ês/Iot | NSCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | NFDD_G | -138 | -138 | ≥ -15 | ≥ -15 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | |

**Table B.1.4-3: NB-IoT intra-frequency measurements for TDD in normal coverage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NRSRP | Minimum NSCH_RP | NRS Ês/Iot | NSCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | NTDD_G | -129 | -129 | ≥ -6 | ≥ -6 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5.. | | | | | |

**Table B.1.4-4: NB-IoT intra-frequency measurements for TDD in enhanced coverage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NRSRP | Minimum NSCH_RP | NRS Ês/Iot | NSCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | NTDD_G | -138 | -138 | ≥ -15 | ≥ -15 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | | | |

## B.1.5 Conditions for measurements of inter-frequency NB-IoT cells for cell re-selection for UE Category NB1

This clause defines the NB-IoT inter-frequency NRSRP, NRSRP Ês/Iot, NSCH_RP and NSCH Ês/Iot applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.1.5 is defined in Section 3.6.

The conditions for measurements of intra-frequency NB-IoT cells in normal coverage for cell re-selection defined in Table B.1.4-1 and B.1.4-3 also apply for inter-frequency NB-IoT cells in normal coverage in this section.

The conditions for measurements of intra-frequency NB-IoT cells in enhanced coverage for cell re-selection defined in Table B.1.4-2 and B.1.4-4 also apply for inter-frequency NB-IoT cells in enhanced coverage in this section.

## B.1.6 Conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection for UE Category 1bis

This clause defines the E-UTRAN intra-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.6-1.

**Table B.1.6-1: Conditions for measurements of intra-frequency E-UTRAN cells for cell re-selection**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -124 | -124 | ≥ -5 | ≥ -5 |
| | FDD_B1 | -123.5 | -123.5 | | |
| | FDD_C, TDD_C | -123 | -123 | | |
| | FDD_D | -122.5 | -122.5 | | |
| | FDD_E, TDD_E | -122 | -122 | | |
| | FDD_F | -121.5 Note 2 | -121.5 Note 2 | | |
| | FDD_G | -121 | -121 | | |
| | FDD_H | -120.5 | -120.5 | | |
| | FDD_N | -117.5 | -117.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Section B.4.2.<br>NOTE 2: The condition is -122 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## B.1.7 Conditions for measurements of E-UTRAN cells for cell re-selection for UE Category M2

### B.1.7.1 Conditions for measurements of intra-frequence E-UTRAN cells for cell selection

This clause defines the E-UTRAN intra-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M2 applicability of the conditions in Appendix B.1.7 is defined in Section 3.1.

The conditions for CE mode A measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.7.1-1 and for E-UTRAN HD-FDD are defined are defined in Table B.1.7.1-2.

The conditions for CE mode B measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.7.1-3 and for E-UTRAN HD-FDD are defined are defined in Table B.1.7.1-4.

**Table B.1.7.1-1: E-UTRAN intra-frequency measurements for FDD and TDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A, TDD_M2_A | -125 | -125 | ≥ -4 | ≥ -4 |
| | FDD_M2_D | -123.5 | -123.5 | | |
| | FDD_M2_E, TDD_M2_E | -123 | -123 | | |
| | FDD_M2_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD_M2_G | -122 | -122 | | |
| | FDD_M2_N | -118.5 | -118.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2. | | | | | |

NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.7.1-2: E-UTRAN intra-frequency measurements for HD-FDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A | -125 | -125 | ≥ -4 | ≥ -4 |
| | FDD_M2_D | -123.5 | -123.5 | | |
| | FDD_M2_E | -123 | -123 | | |
| | FDD_M2_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD_M2_G | -122 | -122 | | |
| | FDD_M2_N | -118.5 | -118.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.7.1-3: E-UTRAN intra-frequency measurements for FDD and TDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A, TDD_M2_A | -136 | -136 | ≥ -15 | ≥ -15 |
| | FDD_M2_D | -134.5 | -134.5 | | |
| | FDD_M2_E TDD_M2_E | -134 | -134 | | |
| | FDD_M2_F | -133.5 Note 1 | -133.5 Note 1 | | |
| | FDD_M2_G | -133 | -133 | | |
| | FDD_M2_N | -129.5 | -129.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

**Table B.1.7.1-4: E-UTRAN intra-frequency measurements for HD-FDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A | -136 | -136 | ≥ -15 | ≥ -15 |
| | FDD_M2_D | -134.5 | -134.5 | | |
| | FDD_M2_E | -134 | -134 | | |
| | FDD_M2_F | -133.5 Note 1 | -133.5 Note 1 | | |
| | FDD_M2_G | -133 | -133 | | |
| | FDD_M2_N | -129.5 | -129.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## B.1.7.2 Condition for measurements of inter-frequence E-UTRAN cells for cell selection

This clause defines the E-UTRAN inter-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M2 applicability of the conditions in Appendix B.1.7 is defined in Section 3.1.

The conditions for CE mode A measurements of FDD and TDD inter-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.7.2-1 and for E-UTRAN HD-FDD are defined are defined in Table B.1.7.2-2.

The conditions for CE mode B measurements of FDD and TDD inter-frequency E-UTRAN cells for cell re-selection are defined in Table B.1.7.2-3 and for E-UTRAN HD-FDD are defined are defined in Table B.1.7.2-4.

**Table B.1.7.2-1: E-UTRAN inter-frequency measurements for FDD and TDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A, TDD_M2_A | -125 | -125 | ≥ -4 | ≥ -4 |
| | FDD_M2_D | -123.5 | -123.5 | | |
| | FDD_M2_E, TDD_M2_E | -123 | -123 | | |
| | FDD_M2_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD_M2_G | -122 | -122 | | |
| | FDD_M2_N | -118.5 | -118.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table B.1.7.2-2: E-UTRAN inter-frequency measurements for HD-FDD for normal coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A | -125 | -124 | ≥ -4 | ≥ -4 |
| | FDD_M2_D | -123.5 | -122.5 | | |
| | FDD_M2_E | -123 | -122 | | |
| | FDD_M2_F | -122.5 Note 2 | -121.5 Note 2 | | |
| | FDD_M2_G | -122 | -121 | | |
| | FDD_M2_N | -118.5 | -117.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table B.1.7.2-3: E-UTRAN inter-frequency measurements for FDD and TDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A, TDD_M2_A | -136 | -136 | ≥ -15 | ≥ -15 |
| | FDD_M2_D | -134.5 | -134.5 | | |
| | FDD_M2_E TDD_M2_E | -134 | -134 | | |
| | FDD_M2_F | -133.5 Note 1 | -133.5 Note 1 | | |
| | FDD_M2_G | -133 | -133 | | |
| | FDD_M2_N | -129.5 | -129.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

**Table B.1.7.2-4: E-UTRAN inter-frequency measurements for HD-FDD for enhanced coverage**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_M2_A | -136 | -136 | ≥ -15 | ≥ -15 |
| | FDD_M2_D | -134.5 | -134.5 | | |
| | FDD_M2_E | -134 | -134 | | |

| | | | | | |
|---|---|---|---|---|---|
| | FDD_M2_F | -133.5 Note 1 | -133.5 Note 1 | | |
| | FDD_M2_G | -133 | -133 | | |
| | FDD_M2_N | -129.5 | -129.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### B.1.8 Conditions for measurements of inter-frequency E-UTRAN cells for cell re-selection for UE Category M1

This clause defines the E-UTRAN inter-frequency RSRP, RSRP Ês/Iot, SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.1.3 is defined in Section 3.1.

The conditions for normal coverage measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection defined in Table B.1.3-1 and for E-UTRAN HD-FDD defined in Table B.1.3-2 also apply for E-UTRAN FDD, TDD and HD-FDD inter-frequency E-UTRAN cells for cell reselection.

The conditions for enhanced coverage measurements of FDD and TDD intra-frequency E-UTRAN cells for cell re-selection defined in Table B.1.3-3 and for E-UTRAN HD-FDD defined in Table B.1.3-4 also apply for E-UTRAN FDD, TDD, and HD-FDD inter-frequency E-UTRAN cells for re-selection.

## B.2 Conditions for UE Measurements Procedures in RRC_CONNECTED State

### B.2.1 Conditions for E-UTRAN intra-frequency measurements

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for intra-frequency E-UTRAN measurements are defined in Table B.2.1-1.

**Table B.2.1-1: E-UTRAN intra-frequency measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD_A, TDD_A | -127 | ≥ -6 |
| | FDD_B1, FDD_B2 | -126.5 | |
| | FDD_C, TDD_C | -126 | |
| | FDD_D | -125.5 | |
| | FDD_E, TDD_E | -125 | |
| | FDD_F | -124.5 Note 2 | |
| | FDD_G | -124 | |
| | FDD_H | -123.5 | |
| | FDD_N | -120.5 | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

### B.2.2 Conditions for E-UTRAN intra-frequency measurements with autonomous gaps

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for intra-frequency E-UTRAN measurements with autonomous gap are as in Table B.2.1-1.

**Table B.2.2-1: Void**

## B.2.3 Conditions for E-UTRAN inter-frequency measurements

This clause defines the E-UTRAN inter-frequency SCH_RP, SCH Ês/Iot, RSRP and RSRP Ês/Iot applicable for a corresponding operating band.

The conditions for inter-frequency E-UTRAN measurements with autonomous gap are defined in Table B.2.3-1.

**Table B.2.3-1: E-UTRAN inter-frequency measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -125 | -125 | ≥ -4 | ≥ -4 |
| | FDD_B1, FDD_B2 | -124.5 | -124.5 | | |
| | FDD_C, TDD_C | -124 | -124 | | |
| | FDD_D | -123.5 | -123.5 | | |
| | FDD_E, TDD_E | -123 | -123 | | |
| | FDD_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD_G | -122 | -122 | | |
| | FDD_H | -121.5 | -121.5 | | |
| | FDD_N | -118.5 | -118.5 | | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: The condition is -123 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## B.2.4 Conditions for E-UTRAN inter-frequency measurements with autonomous gaps

This clause defines the E-UTRAN inter-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for inter-frequency E-UTRAN measurements with autonomous gap are defined in Table B.2.4-1.

**Table B.2.4-1: E-UTRAN inter-frequency measurements with autonomous gaps**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD_A, TDD_A | -125 | ≥ -4 |
| | FDD_B1, FDD_B2 | -124.5 | |
| | FDD_C, TDD_C | -124 | |
| | FDD_D | -123.5 | |
| | FDD_E, TDD_E | -123 | |
| | FDD_F | -122.5 Note 2 | |
| | FDD_G | -122 | |
| | FDD_H | -121.5 | |
| | FDD_N | -118.5 | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: The condition is -123 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## B.2.5 Conditions for E-UTRAN OTDOA intra-frequency RSTD Measurements

This clause defines the E-UTRAN intra-frequency PRP1,2 applicable for a corresponding operating band

The conditions for E-UTRAN OTDOA intra-frequency RSTD measurements are defined in Table B.2.5-1

**Table B.2.5-1: E-UTRAN OTDOA intra-frequency RSTD measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_B1, FDD_B2 | -126.5 |
| | FDD_C, TDD_C | -126 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_H | -123.5 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3. | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | |

## B.2.6 Conditions for E-UTRAN OTDOA inter-frequency RSTD Measurements

This clause defines the E-UTRAN inter-frequency PRP1,2 applicable for a corresponding operating band.

The conditions for E-UTRAN OTDOA inter-frequency RSTD measurements are defined in Table B.2.5-1.

## B.2.7 Conditions for Measurements of the secondary component carrier with deactivated SCell

This clause defines the SCH_RP and SCH Ês/Iot for measurements in the secondary component carrier applicable for a corresponding operating band.

The conditions for measurements of the secondary component carrier with deactivated SCell are defined in Table B.2.7-1.

**Table B.2.7-1: Measurements of the secondary component carrier with deactivated SCell**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD_A, TDD_A | -127 | ≥ -6 |
| | FDD_B1, FDD_B2 | -126.5 | |
| | FDD_C, TDD_C | -126 | |
| | FDD_D | -125.5 | |
| | FDD_E, TDD_E | -125 | |
| | FDD_F | -124.5 Note 2 | |
| | FDD_G | -124 | |
| | FDD_H | -123.5 | |
| | FDD_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3. | | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

## B.2.8 Conditions for E-UTRAN Intra-Frequency Measurements under Time Domain Measurement Resource Restriction

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for intra-frequency E-UTRAN measurements under time domain measurement resource restriction are defined in Table B.2.8-1.

**Table B.2.8-1: E-UTRAN intra-frequency measurements under time domain measurement resource restriction**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD_A, TDD_A | -127 | ≥ -7.5 |
| | FDD_B1, FDD_B2 | -126.5 | |
| | FDD_C, TDD_C | -126 | |
| | FDD_D | -125.5 | |
| | FDD_E, TDD_E | -125 | |
| | FDD_F | -124.5 Note 2 | |
| | FDD_G | -124 | |
| | FDD_H | -123.5 | |
| | FDD_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

## B.2.9 Conditions for E-UTRAN Intra-Frequency Measurements under Time Domain Measurement Resource Restriction with CRS Assistance Information

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for intra-frequency E-UTRAN measurements under time domain measurement resource restriction with CRS assistance information are defined in Table B.2.9-1.

**Table B.2.9-1: E-UTRAN intra-frequency measurements under time domain measurement resource restriction with CRS assistance information**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD_A, TDD_A | -127 | ≥ -11.07 |
| | FDD_B1, FDD_B2 | -126.5 | |
| | FDD_C, TDD_C | -126 | |
| | FDD_D | -125.5 | |
| | FDD_E, TDD_E | -125 | |
| | FDD_F | -124.5 Note 2 | |
| | FDD_G | -124 | |
| | FDD_H | -123.5 | |
| | FDD_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

# B.2.10 Conditions for E-UTRAN intra-frequency discovery signal measurements

## B.2.10.1 Conditions for E-UTRAN intra-frequency CRS-based measurements

This clause defines the E-UTRAN intra-frequency SCH_RP, SCH Ês/Iot in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements

The conditions for E-UTRAN intra-frequency CRS based discovery signal measurements are as in Table B.2.1-1.

## B.2.10.2 Conditions for E-UTRAN intra-frequency CSI-RS based measurements

This clause defines the E-UTRAN intra-frequency SCH_RP, SCH Ês/Iot, CSI-RSRP, and CSI-RS Ês/Iot in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for E-UTRAN intra-frequency CRI-RS based discovery signal measurements in discovery signal occasions are specified in Table B.2.10.2-1.

**Table B.2.10.2-1: E-UTRAN intra-frequency discovery signal measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum CSI-RSRP Note 1 | Minimum SCH_RP Note 1 | CSI-RS Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -121 | -127 | ≥ 0 | ≥ -6 |
| | FDD_B1, FDD_B2 | -120.5 | -126.5 | | |
| | FDD_C, TDD_C | -120 | -126 | | |
| | FDD_D | -119.5 | -125.5 | | |
| | FDD_E, TDD_E | -119 | -125 | | |
| | FDD_F | -118.5 Note 2 | -124.5 Note 2 | | |
| | FDD_G | -118 | -124 | | |
| | FDD_H | -117.5 | -123.5 | | |
| | FDD_N | -114.5 | -120.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -123 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

# B.2.11 Conditions for E-UTRAN inter-frequency discovery signal measurements

## B.2.11.1 Conditions for E-UTRAN inter-frequency CRS-based measurements

This clause defines the E-UTRAN inter-frequency SCH_RP, SCH Ês/Iot, RSRP, and Ês/Iot in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements.

The conditions for E-UTRAN inter-frequency CRS-based discovery signal measurements in discovery signal occasions are specified in Table B.2.11.1-1.

**Table B.2.11.1-1: E-UTRAN inter-frequency discovery signal measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 | Minimum SCH_RP Note 1 | RSRP Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -125 | -125 | ≥ -6 | ≥ -6 |
| | FDD_B1, FDD_B2 | -124.5 | -124.5 | | |
| | FDD_C, TDD_C | -124 | -124 | | |
| | FDD_D | -123.5 | -123.5 | | |
| | FDD_E, TDD_E | -123 | -123 | | |
| | FDD_F | -122.5 Note 2 | -122.5 Note 2 | | |
| | FDD_G | -122 | -122 | | |

| | | | | | |
|---|---|---|---|---|---|
| | FDD_H | -121.5 | -121.5 | | |
| | FDD_N | -118.5 | -118.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -123 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

## B.2.11.2 Conditions for E-UTRAN inter-frequency CSI-RS based measurements

This clause defines the E-UTRAN inter-frequency SCH_RP, SCH Ês/Iot, CSI-RSRP, and CSI-RS Ês/Iot in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for E-UTRAN inter-frequency CRS-based discovery signal measurements in discovery signal occasions are specified in Table B.2.11.2-1.

**Table B.2.11.2-1: E-UTRAN inter-frequency discovery signal measurements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum CSI-RSRP Note 1 | Minimum SCH_RP Note 1 | CSI-RS Ês/Iot | SCH Ês/Iot |
|---|---|---|---|---|---|
| | | dBm/15kHz | dBm/15kHz | dB | dB |
| Conditions | FDD_A, TDD_A | -119 | -125 | ≥ 0 | ≥ -6 |
| | FDD_B1, FDD_B2 | -118.5 | -124.5 | | |
| | FDD_C, TDD_C | -118 | -124 | | |
| | FDD_D | -117.5 | -123.5 | | |
| | FDD_E, TDD_E | -117 | -123 | | |
| | FDD_F | -116.5 Note 2 | -122.5 Note 2 | | |
| | FDD_G | -116 | -122 | | |
| | FDD_H | -115.5 | -121.5 | | |
| | FDD_N | -112.5 | -118.5 | | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -123 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | |

# B.2.12 Conditions for E-UTRAN intra-frequency discovery signal measurements under operation with frame structure 3

This section defines the E-UTRAN intra-frequency SCH_RP in discovery signal occasions [16], applicable for a corresponding operating band for discovery signal measurements under frame structure type 3.

The conditions for E-UTRAN intra-frequency discovery signal measurements are defined in Table B.2.12-1.

**Table B.2.12-1: E-UTRAN intra-frequency measurements under operation with frame structure 3**

| Parameter | E-UTRA operating band groups Note 2 | Minimum SCH_RP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.2.13 Conditions for E-UTRAN inter-frequency discovery signal measurements under operation with frame structure 3

## B.2.13.1 Conditions for E-UTRAN inter-frequency CRS-based measurements

This section defines the E-UTRAN inter-frequency SCH_RP in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements under frame structure 3.

The conditions for E-UTRAN inter-frequency CRS-based discovery signal measurements in discovery signal occasions are specified in Table B.2.13.1-1.

**Table B.2.13.1-1: E-UTRAN inter-frequency discovery signal measurements**

| Parameter | E-UTRA operating band groups Note 2 | Minimum SCH_RP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

## B.2.13.2 Conditions for E-UTRAN inter-frequency CSI-RS based measurements

This section defines the E-UTRAN inter-frequency SCH_RP in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for E-UTRAN inter-frequency CSI-RS based discovery signal measurements in discovery signal occasions under frame structure 3 are specified in Table B.2.13.2-1.

**Table B.2.13.2-1: E-UTRAN inter-frequency discovery signal measurements**

| Parameter | E-UTRA operating band groups Note 2 | Minimum SCH_RP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.2.14 Conditions for E-UTRAN intra-frequency measurements by UE Category M1

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.2.14 is defined in Section 3.1.

The conditions for CE mode A intra-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.14-1 and for E-UTRAN HD-FDD measurements are defined in Table B.2.14-2.

The conditions for CE mode B for intra-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.14-3 and for E-UTRAN HD-FDD measurements are defined in Table B.2.14-4.

**Table B.2.14-1: E-UTRAN intra-frequency measurements for FDD and TDD for CE mode A**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -127 | ≥ -6 |
| | FDD-M1_B | -126.5 | |
| | FDD-M1_D | -125.5 | |
| | FDD-M1_E, TDD-M1_E | -125 | |
| | FDD-M1_F | -124.5 Note 2 | |
| | FDD-M1_G | -124 | |
| | FDD-M1_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.14-2: E-UTRAN intra-frequency measurements for HD-FDD for CEModeA**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, | -127 | ≥ -6 |
| | FDD-M1_B | -126.5 | |
| | FDD-M1_D | -125.5 | |
| | FDD-M1_E | -125 | |
| | FDD-M1_F | -124.5 Note 2 | |
| | FDD-M1_G | -124 | |
| | FDD-M1_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.14-3: E-UTRAN intra-frequency measurements for FDD and TDD for CEModeB**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -136 | ≥ -15 |
| | FDD-M1_B | -126.5 | |
| | FDD-M1_D | -134.5 | |
| | FDD-M1_E, TDD-M1_E | -134 | |
| | FDD-M1_F | -133.5 Note 2 | |
| | FDD-M1_G | -133 | |
| | FDD-M1_N | -129.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.14-4: E-UTRAN intra-frequency measurements for HD-FDD for CE mode B**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, | -136 | ≥ -15 |
| | FDD-M1_B | -126.5 | |
| | FDD-M1_D | -134.5 | |
| | FDD-M1_E | -134 | |
| | FDD-M1_F | -133.5 Note 2 | |
| | FDD-M1_G | -133 | |
| | FDD-M1_N | -129.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

## B.2.15 Conditions for NB-IoT intra-frequency measurements by UE Category NB1

This clause defines the NB-IoT intra-frequency NSCH_RP and NSCH Ês/Iot applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.2.15 is defined in Section 3.6.

The conditions for intra-frequency measurements in normal coverage are defined in Table B.2.15-1 and B.2.15-3.

The conditions for intra-frequency measurements in denhanced coverage are defined in Table B.2.15-2 and B.2.15-4.

**Table B.2.15-1: NB-IoT intra-frequency measurements for HD-FDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NSCH_RP | NSCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | NFDD_G | -129 | ≥ -6 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | |

**Table B.2.15-2: NB-IoT intra-frequency measurements for HD-FDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NSCH_RP | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | NFDD_G | -138 | ≥ -15 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | |

**Table B.2.15-3: NB-IoT intra-frequency measurements for TDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NSCH_RP | NSCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | NTDD_G | -129 | ≥ -6 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | |

**Table B.2.15-4: NB-IoT intra-frequency measurements for TDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NSCH_RP | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | NTDD_G | -138 | ≥ -15 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | | |

## B.2.16 Conditions for NB-IoT intra-frequency RSTD measurements by UE Category NB1

This clause defines the NB-IoT intra-frequency PRP1,2 applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.2.16 is defined in Section 3.1.

The conditions for intra-frequency RSTD measurements in normal coverage are defined in Table B.2.16-1 and B.2.16-3.

The conditions for intra-frequency RSTD measurements in enhanced coverage are defined in Table B.2.16-2 and B.2.16-4.

**Table B.2.16-1: NB-IoT intra-frequency RSTD measurements for HD-FDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NFDD_G | -129 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.16-2: NB-IoT intra-frequency RSTD measurements for HD-FDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NFDD_G | -135 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.16-3: NB-IoT intra-frequency RSTD measurements for TDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NTDD_G | -129 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.16-4: NB-IoT intra-frequency RSTD measurements for TDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NTDD_G | -135 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

## B.2.17 Conditions for NB-IoT inter-frequency RSTD measurements by UE Category NB1

This clause defines the NB-IoT inter-frequency PRP1,2 applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.2.17 is defined in Section 3.1.

The conditions for intra-frequency RSTD measurements in normal coverage are defined in Table B.2.17-1 and B.2.17-3.

The conditions for intra-frequency RSTD measurements in enhanced coverage are defined in Table B.2.17-2 and B.2.17-4.

**Table B.2.17-1: NB-IoT inter-frequency RSTD measurements for HD-FDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NFDD_G | -129 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.17-2: NB-IoT inter-frequency RSTD measurements for HD-FDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NFDD_G | -135 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.17-3: NB-IoT inter-frequency RSTD measurements for TDD in normal coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NTDD_G | -129 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

**Table B.2.17-4: NB-IoT inter-frequency RSTD measurements for TDD in enhanced coverrage**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum PRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NTDD_G | -135 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5 | | |

# B.2.18 Conditions for E-UTRAN inter-frequency measurements by UE Category M1

This clause defines the E-UTRAN inter-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.2.18 is defined in Section 3.1.

The conditions for CE mode A inter-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.18-1 and for E-UTRAN HD-FDD measurements are defined in Table B.2.18-2.

The conditions for CE mode B for inter-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.18-3 and for E-UTRAN HD-FDD measurements are defined in Table B.2.18-4.

**Table B.2.18-1: E-UTRAN inter-frequency measurements for FDD and TDD for CEModeA**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -127 | ≥ -6 |
| | FDD-M1_D | -125.5 | |
| | FDD-M1_E, TDD-M1_E | -125 | |
| | FDD-M1_F | -124.5 Note 2 | |
| | FDD-M1_G | -124 | |
| | FDD-M1_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2. | | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.18-2: E-UTRAN inter-frequency measurements for HD-FDD for CEModeA**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, | -127 | ≥ -6 |
| | FDD-M1_D | -125.5 | |
| | FDD-M1_E | -125 | |
| | FDD-M1_F | -124.5 Note 2 | |
| | FDD-M1_G | -124 | |
| | FDD-M1_N | -120.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2. | | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.18-3: E-UTRAN inter-frequency measurements for FDD and TDD for CEModeB**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, TDD-M1_A | -136 | ≥ -15 |
| | FDD-M1_D | -134.5 | |
| | FDD-M1_E, TDD-M1_E | -134 | |
| | FDD-M1_F | -133.5 Note 1 | |
| | FDD-M1_G | -133 | |
| | FDD-M1_N | -129.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2. | | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

**Table B.2.18-4: E-UTRAN inter-frequency measurements for HD-FDD for CEModeB**

| Parameter | E-UTRA operating band groups Note 3 | Minimum SCH_RP Note 1 | SCH Ês/Iot |
|---|---|---|---|
| | | dBm/15kHz | dB |
| Conditions | FDD-M1_A, | -136 | ≥ -15 |
| | FDD-M1_D | -134.5 | |
| | FDD-M1_E | -134 | |
| | FDD-M1_F | -133.5 Note 1 | |
| | FDD-M1_G | -133 | |
| | FDD-M1_N | -129.5 | |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | |

# B.2.19 Conditions for E-UTRAN measurements by UE Category M2

## B.2.19.1 Conditions for E-UTRAN intra-frequency measurements

This clause defines the E-UTRAN intra-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for intra-frequency measurements are defined in sub-section B.2.14.

## B.2.19.2 Conditions for E-UTRAN inter-frequency measurements

This clause defines the E-UTRAN inter-frequency SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for inter-frequency measurements are defined in sub-section B.2.18.

# B.2.20 Conditions for E-UTRAN inter-frequency RSTD measurements by UE Category M1

This clause defines the E-UTRAN inter-frequency PRP1,2 applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.2.20 is defined in Section 3.1.

The conditions for CE mode A inter-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.20-1 and for E-UTRAN HD-FDD measurements are defined in Table B.2.20-2.

The conditions for CE mode B for inter-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.20-3 and for E-UTRAN HD-FDD measurements are defined in Table B.2.20-4.

**Table B.2.20-1: E-UTRAN inter-frequency measurements for FDD and TDD for CE mode A**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 1 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.20-2: E-UTRAN inter-frequency measurements for HD-FDD for CE mode A**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, | -127 |
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 Note 1 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.20-3: E-UTRAN inter-frequency measurements for FDD and TDD for CE mode B**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -136 |
| | FDD_D | -134.5 |
| | FDD_E, TDD_E | -134 |
| | FDD_F | -133.5 Note 1 |
| | FDD_G | -133 |
| | FDD_N | -129.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.20-4: E-UTRAN inter-frequency measurements for HD-FDD for CE mode B**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, | -136 |
| | FDD_D | -134.5 |
| | FDD_E | -134 |
| | FDD_F | -133.5 Note 1 |
| | FDD_G | -133 |
| | FDD_N | -129.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

## B.2.21 Conditions for E-UTRAN inter-frequency RSTD measurements by UE Category M2

This section defines the inter-frequency PRP applicable for a corresponding operating band for Cat-M2.

The conditions for inter-frequency RSTD measurements are defined in sub-section B.2.20.

## B.2.22 Conditions for E-UTRAN intra-frequency RSTD measurements by UE Category M1

This clause defines the E-UTRAN intra-frequency PRP1,2 applicable for a corresponding operating band. The UE category M1 applicability of the conditions in Appendix B.2.22 is defined in Section 3.1.

The conditions for CE mode A intra-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.22-1 and for E-UTRAN HD-FDD measurements are defined in Table B.2.22-2.

The conditions for CE mode B for intra-frequency E-UTRAN FDD and TDD measurements are defined in Table B.2.22-3 and for E-UTRAN HD-FDD measurements are defined in Table B.2.22-4.

**Table B.2.22-1: E-UTRAN intra-frequency measurements for FDD and TDD for CE mode A**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 1 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.22-2: E-UTRAN intra-frequency measurements for HD-FDD for CE mode A**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, | -127 |
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 Note 1 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.22-3: E-UTRAN intra-frequency measurements for FDD and TDD for CE mode B**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -136 |
| | FDD_D | -134.5 |
| | FDD_E, TDD_E | -134 |
| | FDD_F | -133.5 Note 1 |
| | FDD_G | -133 |
| | FDD_N | -129.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

**Table B.2.22-4: E-UTRAN intra-frequency measurements for HD-FDD for CE mode B**

| Parameter | E-UTRA operating band groups Note 2 | Minimum PRP1,2 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, | -136 |
| | FDD_D | -134.5 |
| | FDD_E | -134 |
| | FDD_F | -133.5 Note 1 |
| | FDD_G | -133 |
| | FDD_N | -129.5 |
| NOTE 1: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

### B.2.23 Conditions for E-UTRAN intra-frequency RSTD measurements by UE Category M2

This section defines the intra-frequency PRP applicable for a corresponding operating band for Cat-M2.

The conditions for intra-frequency RSTD measurements are defined in sub-section B.2.22.

## B.3 Conditions for measurements performance requirements for UE

### B.3.1 Conditions for intra-frequency RSRP and RSRQ Accuracy Requirements

This clause defines the E-UTRAN intra-frequency RSRP applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRP and RSRQ accuracy requirements are defined in Table B.3.1-1.

**Table B.3.1-1: Intra-frequency absolute RSRP and RSRQ Accuracy Requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_B1, FDD_B2 | -126.5 |
| | FDD_C, TDD_C | -126 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_H | -123.5 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.<br>NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | |

### B.3.2 Void

### B.3.3 Conditions for inter-frequency RSRP and RSRQ Accuracy Requirements

This clause defines the E-UTRAN inter-frequency RSRP applicable for a corresponding operating band.

The conditions for inter-frequency absolute RSRP and RSRQ accuracy requirements are defined in Table B.3.1-1.

### B.3.4 Conditions for inter-frequency relative RSRP and RSRQ Accuracy Requirements

This clause defines the E-UTRAN inter-frequency RSRP1,2 applicable for a corresponding operating band.

The conditions for inter-frequency relative RSRP and RSRQ accuracy requirements are defined in Table B.3.8-1.

### B.3.5 Conditions for UE Rx – Tx time difference

This clause defines the E-UTRAN RSRP applicable for a corresponding operating band.

The conditions for UE Rx-Tx time difference are defined in Table B.3.1-1.

## B.3.6 Conditions for intra-frequency Reference Signal Time Difference (RSTD) measurements

This sections defines the E-UTRAN intra-frequency PRP applicable for a corresponding operating band.

The conditions for intra-frequency RSTD measurements are defined in Table B.2.5-1.

## B.3.7 Conditions for inter-frequency RSTD measurements

This sections defines the E-UTRAN inter-frequency PRP applicable for a corresponding operating band.

The conditions for inter-frequency RSTD measurements are defined in Table B.2.5-1.

## B.3.8 Conditions for Intra-Frequency Relative RSRP Accuracy Requirements

This clause defines the E-UTRAN intra-frequency RSRP1,2 applicable for a corresponding operating band.

The conditions for intra-frequency relative RSRP accuracy requirements are specified in Table B.3.8-1.

**Table B.3.8-1: Intra-frequency relative RSRP accuracy requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_B1, FDD_B2 | -126.5 |
| | FDD_C, TDD_C | -126 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_H | -123.5 |
| | FDD_N | -120.5 |

NOTE 1: This condition level is increased by $\Delta$>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA operating band groups are as defined in Section 3.5.

## B.3.9 Conditions for Intra-Frequency Absolute RSRP and RSRQ Accuracy Requirements under Time Domain Measurement Resource Restriction

This clause defines the E-UTRAN intra-frequency RSRP applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRP and RSRQ accuracy requirements under time domain measurement resource restriction are as specified in Table B.3.1-1.

## B.3.10 Conditions for Intra-Frequency Relative RSRP Accuracy Requirements under Time Domain Measurement Resource Restriction

This clause defines the E-UTRAN intra-frequency RSRP1,2 applicable for a corresponding operating band.

The conditions for intra-frequency relative RSRP accuracy requirements under time domain measurement resource restriction are defined in Table B.3.8-1.

## B.3.11 Conditions for Intra-Frequency Absolute RSRP and RSRQ Accuracy Requirements under Time Domain Measurement Resource Restriction with CRS Assistance Information

This clause defines the E-UTRAN intra-frequency RSRP applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRP and RSRQ accuracy requirements under time domain measurement resource restriction with CRS assistance information are as specified in Table B.3.1-1.

## B.3.12 Conditions for Intra-Frequency Relative RSRP Accuracy Requirements under Time Domain Measurement Resource Restriction with CRS Assistance Information

This clause defines the E-UTRAN intra-frequency RSRP1,2 applicable for a corresponding operating band.

The conditions for intra-frequency relative RSRP accuracy requirements under time domain measurement resource restriction with CRS assistance information are as specified in Table B.3.8-1.

## B.3.13 Conditions for UE Rx–Tx Time Difference Measurement under Time Domain Measurement Resource Restriction with CRS Assistance Information

This clause defines the E-UTRAN RSRP applicable for a corresponding operating band.

The conditions for UE Rx-Tx time difference measurements, when time domain measurement resource restriction pattern and CRS assistance information are provided, are as defined in Table B.3.1-1.

## B.3.14 Conditions for Intra-Frequency Absolute Discovery Signal Measurement Accuracy Requirements

### B.3.14.1 Conditions for Intra-frequency CRS-based measurements

This clause defines the intra-frequency RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements.

The conditions for intra-frequency absolute RSRP and RSRQ accuracy requirements for CRS-based discovery signal measurements in discovery signal occasions are as in Table B.3.1-1

### B.3.14.2 Conditions for Intra-frequency CSI-RS-based measurements

This clause defines the intra-frequency CSI-RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for intra-frequency absolute CSI-RSRP accuracy requirements for CSI-RS-based discovery signal measurements in discovery signal occasions are specified in Table B.3.14.2-1

**Table B.3.14.2-1: Intra-frequency Absolute CSI-RSRP Accuracy Requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum CSI-RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_B1, FDD_B2 | -126.5 |
| | FDD_C, TDD_C | -126 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |

| | | |
|---|---|---|
| | FDD_H | -123.5 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3. | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.3.15 Conditions for Intra-Frequency Relative Discovery Signal Measurement Accuracy Requirements

## B.3.15.1 Conditions for Intra-frequency CRS-based measurements

This clause defines the intra-frequency RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements.

The conditions for intra-frequency relative RSRP accuracy requirements for CRS-based discovery signal measurements in discovery signal occasions are as in Table B.3.8-1

## B.3.15.2 Conditions for Intra-frequency CSI-RS-based measurements

This clause defines the intra-frequency CSI-RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for intra-frequency relative CSI-RSRP accuracy requirements for CSI-RS-based discovery signal measurements in discovery signal occasions are specified in Table B.3.15.2-1

**Table B.3.15.2-1: Intra-frequency Relative CSI-RSRP Accuracy Requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum CSI-RSRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD_A, TDD_A | -127 |
| | FDD_B1, FDD_B2 | -126.5 |
| | FDD_C, TDD_C | -126 |
| | FDD_D | -125.5 |
| | FDD_E, TDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_H | -123.5 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3. | | |
| NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. | | |
| NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.3.16 Conditions for Inter-Frequency Absolute Discovery Signal Measurement Accuracy Requirements

## B.3.16.1 Conditions for Inter-frequency CRS-based measurements

This clause defines the inter-frequency RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements.

The conditions for inter-frequency absolute RSRP and RSRQ accuracy requirements for CRS-based discovery signal measurements in discovery signal occasions are as in Table B.3.1-1

## B.3.16.2 Conditions for Inter-frequency CSI-RS-based measurements

This clause defines the inter-frequency CSI-RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for inter-frequency absolute CSI-RSRP accuracy requirements for CSI-RS-based discovery signal measurements in discovery signal occasions are as in Table B.3.14.2-1.

# B.3.17 Conditions for Inter-Frequency Relative Discovery Signal Measurement Accuracy Requirements

## B.3.17.1 Conditions for Inter-frequency CRS-based measurements

This clause defines the inter-frequency RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CRS based discovery signal measurements.

The conditions for inter-frequency relative RSRP and RSRQ accuracy requirements for CRS-based discovery signal measurements in discovery signal occasions are as in Table B.3.8-1

## B.3.17.2 Conditions for Inter-frequency CSI-RS-based measurements

This clause defines the inter-frequency CSI-RSRP in discovery signal occasions [16], applicable for a corresponding operating band for CSI-RS based discovery signal measurements.

The conditions for inter-frequency relative CSI-RSRP accuracy requirements for CSI-RS-based discovery signal measurements in discovery signal occasions are as in Table B.3.15.2-1.

# B.3.18 Conditions for Intra-frequency Absolute RS-SINR Accuracy Requirements

This clause defines the E-UTRAN intra-frequency RSRP applicable for a corresponding operating band.

The conditions for intra-frequency absolute RS-SINR accuracy requirements are the same as defined in Table B.3.1-1.

# B.3.19 Conditions for Inter-frequency Absolute RS-SINR Accuracy Requirements

This clause defines the E-UTRAN inter-frequency RSRP applicable for a corresponding operating band.

The conditions for inter-frequency absolute RS-SINR accuracy requirements are the same as defined in Table B.3.1-1.

# B.3.20 Conditions for Inter-frequency Relative RS-SINR Accuracy Requirements

This clause defines the E-UTRAN inter-frequency RSRP1,2 applicable for a corresponding operating band.

The conditions for inter-frequency relative RS-SINR accuracy requirements are the same as defined in Table B.3.8-1.

# B.3.21 Conditions for Intra-Frequency Absolute Accuracy Requirements for Measurements under Operation with Frame Structure 3

## B.3.21.1 Conditions for RSRP measurements

This clause defines the intra-frequency absolute RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRP accuracy requirements are defined in Table B.3.21.1-1.

**Table B.3.21.1-1: Intra-frequency absolute RSRP requirements**

| Parameter | E-UTRA operating band groups Note 2 | Minimum RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |

| | | |
|---|---|---|
| **Conditions** | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

## B.3.21.2 Conditions for RSRQ measurements

This clause defines the intra-frequency absolute RSRQ during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRQ accuracy requirements are the same as defined in Table B.3.21.1-1.

## B.3.21.3 Conditions for CSI-RSRP measurements

This clause defines the intra-frequency absolute CSI-RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for intra-frequency absolute RSRP accuracy requirements are defined in Table B.3.21.3-1.

**Table B.3.21.3-1: Intra-frequency absolute CSI-RSRP requirements**

| **Parameter** | **E-UTRA operating band groups** Note 2 | **Minimum CSI-RSRP** Note 1 |
|---|---|---|
| | | **dBm/15kHz** |
| **Conditions** | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.3.22 Conditions for Intra-Frequency Relative Accuracy Requirements for Measurements under Operation with Frame Structure 3

## B.3.22.1 Conditions for RSRP measurements

This clause defines the intra-frequency relative RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for intra-frequency relative RSRP accuracy requirements are as defined in Table B.3.22.1-1.

**Table B.3.22.1-1: Intra-frequency relative RSRP requirements**

| **Parameter** | **E-UTRA operating band groups** Note 2 | **Minimum RSRP1,2** Note 1 |
|---|---|---|
| | | **dBm/15kHz** |
| **Conditions** | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

## B.3.22.2 Void

## B.3.22.3 Conditions for CSI-RSRP measurements

This clause defines the intra-frequency relative CSI-RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for intra-frequency relative CSI-RSRP accuracy requirements are as defined in Table B.3.22.3-1.

**Table B.3.22.3-1: Intra-frequency relative CSI-RSRP requirements**

| **Parameter** | **E-UTRA operating band groups** Note 2 | **Minimum CSI-RSRP1,2** Note 1 |
|---|---|---|

| | | dBm/15kHz |
|---|---|---|
| **Conditions** | FS3_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA operating band groups are as defined in Section 3.5. | | |

# B.3.23 Conditions for Inter-Frequency Absolute Accuracy Requirements for Measurements under Operation with Frame Structure 3

## B.3.23.1 Conditions for RSRP measurements

This clause defines the inter-frequency absolute RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency absolute RSRP accuracy requirements are the same as defined in Table B.3.21.1-1.

## B.3.23.2 Conditions for RSRQ measurements

This clause defines the inter-frequency absolute RSRQ during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency absolute RSRQ accuracy requirements are the same as defined in Table B.3.21.1-1.

## B.3.23.3 Conditions for CSI-RSRP measurements

This clause defines the inter-frequency absolute CSI-RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency absolute CSI-RSRP accuracy requirements are the same as defined in Table B.3.21.3-1.

# B.3.24 Conditions for Inter-Frequency Relative Accuracy Requirements for Measurements under Operation with Frame Structure 3

## B.3.24.1 Conditions for RSRP measurements

This clause defines the inter-frequency relative RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency relative RSRP accuracy requirements are the same as defined in Table B.3.22.1-1.

## B.3.24.2 Conditions for RSRQ measurements

This clause defines the inter-frequency relative RSRQ during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency relative RSRP accuracy requirements are the same as defined in Table B.3.22.1-1.

## B.3.24.3 Conditions for CSI-RSRP measurements

This clause defines the inter-frequency relative CSI-RSRP during the configured DMTC occasion [2] under operation with frame structure 3 [16], applicable for a corresponding operating band.

The conditions for inter-frequency relative CSI-RSRP accuracy requirements are the same as defined in Table B.3.22.3-1.

## B.3.25 Conditions for NB-IoT intra-frequency Absolute NRSRP and NRSRQ Accuracy Requirements for UE Category NB1

This clause defines the NB-IoT intra-frequency NRSRP applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.3.25 is defined in Section 3.6.

The conditions for intra-frequency absolute NRSRP and NRSRQ accuracy requirements are defined in Table B.3.25-1.

**Table B.3.25-1: NB-IoT intra-frequency absolute NRSRP and NRSRQ Accuracy Requirements**

| Parameter | E-UTRA/NR operating band groups Note 1 | Minimum NRSRP |
|---|---|---|
| | | dBm/15kHz |
| Conditions | NFDD_G, NTDD_G | -139.8 |
| NOTE 1: E-UTRA/NR operating band groups are as defined in Section 3.5. | | |

## B.3.26 Conditions for NB-IoT inter-frequency Absolute NRSRP and NRSRQ Accuracy Requirements for UE Category NB1

This clause defines the NB-IoT inter-frequency NRSRP applicable for a corresponding operating band. The UE category NB1 applicability of the conditions in Appendix B.3.26 is defined in Section 3.6.

The conditions for inter-frequency absolute NRSRP and NRSRQ accuracy requirements are defined in Table B.3.25-1.

## B.3.27 Conditions for intra-frequency RSRP and RSRQ Accuracy Requirements for Category 0

This clause defines the E-UTRAN intra-frequency RSRP applicable for a corresponding operating band. The UE category 0 applicability of the conditions in Appendix B.3.27 is defined in Section 3.1.

The conditions for intra-frequency absolute RSRP and RSRQ accuracy requirements are defined in Table B.3.27-1.

**Table B.3.27-1: Intra-frequency absolute RSRP and RSRQ Accuracy Requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD-0_A, TDD-0_A | -127 |
| | FDD-0_E, TDD-0_E | -125 |
| | FDD-0_G | -124 |

## B.3.28 Conditions for Intra-Frequency Relative RSRP Accuracy Requirements for Category 0

This clause defines the E-UTRAN intra-frequency RSRP1,2 applicable for a corresponding operating band. The UE category 0 applicability of the conditions in Appendix B.3.28 is defined in Section 3.1.

The conditions for intra-frequency relative RSRP accuracy requirements are specified in Table B.3.28-1.

**Table B.3.28-1: Intra-frequency relative RSRP accuracy requirements**

| Parameter | E-UTRA operating band groups Note 3 | Minimum RSRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| Conditions | FDD-0_A, TDD-0_A | -127 |
| | FDD-0_E, TDD-0_E | -125 |
| | FDD-0_G | -124 |

### B.3.29 Conditions for intra-frequency Reference Signal Time Difference (RSTD) measurements for NB1

This sections defines the intra-frequency PRP applicable for a corresponding operating band for NB1.

The conditions for intra-frequency RSTD measurements are defined in Table B.2.16-1 and Table B.2.16-2

### B.3.30 Conditions for inter-frequency Reference Signal Time Difference (RSTD) measurements for NB1

This sections defines the inter-frequency PRP applicable for a corresponding operating band for NB1.

The conditions for inter-frequency RSTD measurements are defined in Table B.2.17-1 and Table B.2.17-2.

### B.3.31 Conditions for inter-frequency Reference Signal Time Difference (RSTD) measurements for Cat M1

This sections defines the inter-frequency PRP applicable for a corresponding operating band for Cat-M1.

The conditions for inter-frequency RSTD measurements are defined in sub-section B.2.20.

### B.3.32 Conditions for inter-frequency Reference Signal Time Difference (RSTD) measurements for Cat M2

This sections defines the inter-frequency PRP applicable for a corresponding operating band for Cat-M2.

The conditions for inter-frequency RSTD measurements are defined in sub-section B.2.21.

### B.3.33 Conditions for intra-frequency Reference Signal Time Difference (RSTD) measurements for Cat M1

This section defines the intra-frequency PRP applicable for a corresponding operating band for Cat-M1.

The conditions for intra-frequency RSTD measurements are defined in sub-section B.2.22.

### B.3.34 Conditions for intra-frequency Reference Signal Time Difference (RSTD) measurements for Cat M2

This section defines the intra-frequency PRP applicable for a corresponding operating band for Cat-M2.

The conditions for intra-frequency RSTD measurements are defined in sub-section B.2.23.

## B.4 RRM Requirements Exceptions

### B.4.1 General

### B.4.2 Receiver sensitivity relaxation for UE supporting CA

For a UE supporting inter-band carrier aggregation configuration with uplink in one E-UTRA band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}$>0 dB as defined in TS 36.101 [5], Table 7.3.1-1A, the relevant side conditions specifying received power levels (E-UTRA RSRP, SCH_RP, PRP, CSI-RSRP, and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for each of the downlink E-UTRA bands.

NOTE: This side condition adjustment applies only for a UE supporting a single inter-band LTE CA band combination. For a UE supporting additional inter-band LTE CA band combinations, the $\Delta R_{IB,c}$ for all bands supported by the UE, need to be studied [5].

## B.4.3 Receiver sensitivity relaxation for UE configured with CA

### B.4.3.1 Inter-band carrier aggregation

In this section, requirements exceptions are described for the UE configured with inter-band carrier aggregation with one uplink active in low operating band.

A relevant side condition (e.g., E-UTRA RSRP, SCH_RP, PRP, CSI-RSRP, and Io) in a requirement shall be increased by the amount Δ=L2-L1, where L1 is the reference sensitivity level specified in 36.101, Table 7.3.1-1, and L2 is the reference sensitivity level specified in 36.101, Table 7.3.1A-0a, when the following conditions are fulfilled,

- both downlink component carriers on different bands are configured with CA and active,
- the single uplink is active in the low operating band,
- the exception requirements specified in TS36.101, Table 7.3.1A-0a, apply.

If the relaxation Δ specified in this section applies, then the relaxation specified in Section B.4.2 should not be applied.

### B.4.3.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation configuration with uplink in one E-UTRA band, if there is a relaxation of receiver sensitivity $\Delta R_{IBNC}>0$ as defined in TS 36.101 [5], Table 7.3.1A-3, the relevant side conditions specifying received power levels (E-UTRA RSRP, SCH_RP, PRP, CSI-RSRP, and Io) shall be increased by the amount $\Delta=\Delta R_{IBNC}$ defined for the downlink SCC, when the following conditions are fulfilled,

- both downlink component carriers are configured with CA and active,
- one uplink carrier is active,
- the exception requirements specified in TS36.101, Table 7.3.1A-3, apply.

If the relaxation Δ specified in this section applies, then the relaxation specified in Section B.4.2 should not be applied.

### B.4.3.3 Inter-band carrier aggregation with operating bands without uplink band

In this section, requirements are described for the UE configured with inter-band carrier aggregation involving one operating band without uplink band.

There is no relaxation in relevant side condition (e.g., E-UTRA RSRP, SCH_RP, PRP, CSI-RSRP, and Io) in a requirement, i.e., Δ=0, when the following conditions are fulfilled,

- both downlink component carriers on different bands are configured with CA and active,
- the single uplink is active in the high operating band,
- conditions specified in TS36.101, Table 7.3.1A-0d, apply.

If Δ specified in this section applies, then no other additional relaxation to REFSENS shall be applied.

# B.5 Conditions for Measurement Performance Requirements for ProSe UE

## B.5.1 Conditions for S-RSRP Accuracy Requirements

This clause defines the S-RSRP applicable for a corresponding operating band.

The conditions for absolute S-RSRP accuracy requirements are defined in Table B.5.1-1.

**Table B.5.1-1: Absolute S-RSRP Requirements**

| Parameter | E-UTRA ProSe operating band groups Note 3 | Minimum S-RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.

## B.5.2 Conditions for Relative S-RSRP Accuracy Requirements

This clause defines the S-RSRP1,2 applicable for a corresponding operating band.

The conditions for relative S-RSRP accuracy requirements are specified in Table B.5.2-1.

**Table B.5.2-1: Relative S-RSRP accuracy requirements**

| Parameter | E-UTRA ProSe operating band groups Note 3 | Minimum S-RSRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 Note 2 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: The condition is -125 dBm/15kHz when the carrier frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz.
NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.

## B.5.3 Conditions for Selection/Reselection to Intra-frequency SyncRef UE

This clause defines the ProSe SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for selection/reselection to intra-frequency SyncRef UE are defined in Table B.5.3-1.

**Table B.5.3-1: ProSe synchronization measurements**

| Parameter | E-UTRA ProSe operating band groups Note 3 | Minimum ProSe SCH_RP Note 1 | ProSe SCH Ês/Iot Note 4 |
|---|---|---|---|
| | | dBm/15kHz | dB |
| | FDD_D | -125.5 | ≥ -4 |
| | FDD_E | -125 | |
| | FDD_F | -124.5 | |
| | FDD_G | -124 | |
| | FDD_N | -120.5 | |

NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.
NOTE 2: Void
NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.
NOTE 4: ProSe SCH Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS

## B.5.4 Conditions for SD-RSRP Accuracy Requirements

This clause defines the intra-frequency SD-RSRP applicable for a corresponding operating band.

The conditions for intra-frequency absolute SD-RSRP accuracy requirements are defined in Table B.5.4-1.

**Table B.5.4-1: Absolute SD-RSRP Requirements**

| Parameter | E-UTRA ProSe operating band groups Note 3 | Minimum SD-RSRP Note 1 dBm/15kHz |
|---|---|---|
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: Void<br>NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands. | | |

## B.5.5 Conditions for Relative SD-RSRP Accuracy Requirements

This clause defines the intra-frequency SD-RSRP applicable for a corresponding operating band.

The conditions for intra-frequency relative S-RSRP accuracy requirements are specified in Table B.5.5-1.

**Table B.5.5-1: Relative S-RSRP accuracy requirements**

| Parameter | E-UTRA ProSe operating band groups Note 3 | Minimum SD-RSRP1,2 Note 1 dBm/15kHz |
|---|---|---|
| | FDD_D | -125.5 |
| | FDD_E | -125 |
| | FDD_F | -124.5 |
| | FDD_G | -124 |
| | FDD_N | -120.5 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: Void<br>NOTE 3: E-UTRA ProSe operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands. | | |

# B.6 Conditions for V2X

## B.6.1 Test parameters for GNSS signals

This clause defines the reference signal power levels of generated salellites for a corresponding GNSS, which will be used in V2V and V2X test cases.

**Table B.6.1-1: GNSS Referenece Signal Power Parameters**

| System | Parameters | Unit | Value |
|---|---|---|---|
| | Number of generated satellites per system | - | 6 |
| GPS(1) | Reference signal power level for all satellites | dBm | -128.5 |
| Galileo | Reference signal power level for all satellites | dBm | -127 |
| GLONASS | Reference signal power level for all satellites | dBm | -131 |
| BDS | Reference signal power level for all satellites | dBm | -133 |
| NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on UE capabilities.<br>NOTE 2: The DUT UE does not need to support all systems. The DUT UE shall support at least one system and will be test for the supported systems. | | | |

## B.6.2 Conditions for Absolute S-RSRP Accuracy Requirements

This clause defines the S-RSRP applicable for a corresponding operating band.

The conditions for absolute S-RSRP accuracy requirements are defined in Table B.6.2-1.

**Table B.6.2-1: Absolute S-RSRP Requirements**

| Parameter | E-UTRA V2X operating band groups Note2 | Minimum S-RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| | TDD_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands. | | |

## B.6.3 Conditions for Relative S-RSRP Accuracy Requirements

This clause defines the S-RSRP1,2 applicable for a corresponding operating band.

The conditions for relative S-RSRP accuracy requirements are specified in Table B.6.3-1.

**Table B.6.3-1: Relative S-RSRP accuracy requirements**

| Parameter | E-UTRA V2X operating band groups Note 2 | Minimum S-RSRP1,2 Note 1 |
|---|---|---|
| | | dBm/15kHz |
| | TDD_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands. | | |

## B.6.4 Conditions for Selection/Reselection to Intra-frequency SyncRef UE

This clause defines the V2X SCH_RP and SCH Ês/Iot applicable for a corresponding operating band.

The conditions for selection/reselection to intra-frequency SyncRef UE are defined in Table B.6.4-1.

**Table B.6.4-1: V2X synchronization measurements**

| Parameter | E-UTRA V2X operating band groups Note 2 | Minimum V2X SCH_RP Note 1 | V2X SCH Ês/Iot Note 3 |
|---|---|---|---|
| | | dBm/15kHz | dB |
| | TDD_G | 120 | ≥ 0 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands.<br>NOTE 3: V2X SCH Ês/Iot for a SyncRef UE is the minimum of the Ês/Iot of PSSS/PSBCH and the Ês/Iot of SSSS<br>NOTE 4: The SyncRef UE transmission frequency shall be accurate to within ±5 PPM compared to the absolute frequency. | | | |

## B.6.5 Conditions for Absolute PSSCH-RSRP Accuracy Requirements

This clause defines the PSSCH-RSRP applicable for a corresponding operating band.

The conditions for absolute PSSCH-RSRP accuracy requirements are defined in Table B.6.5-1.

**Table B.6.5-1: Absolute PSSCH-RSRP Requirements**

| Parameter | E-UTRA V2X operating band groups Note2 | Minimum PSSCH-RSRP Note 1 |
|---|---|---|
| | | dBm/15kHz |
| | TDD_G | -124 |
| NOTE 1: This condition level is increased by Δ>0, when applicable, as described in Sections B.4.2 and B.4.3.<br>NOTE 2: E-UTRA V2X operating band groups are as defined in Section 3.5 for the corresponding E-UTRA operating bands. | | |

# B.7 Conditions for sTTI and 1ms-TTI with 3 Subframe HARQ Processing

## B.7.1 Conditions for Maximum Timing Difference Between Uplink and Downlink Carriers in Carrier Aggregation

This clause defines the condition on the maximum timing difference between the earliest uplink carrier and the latest downlink carrier in carrier aggregation when a UE is configured with at least one serving cell that is configured with *dl-STTI-Length-r15* or *ShortProcessingTime =TRUE*.

The timing difference between the earliest uplink carrier and the latest downlink carrier among all the serving cells configured to the UE is no larger than

$maxTd_1$ when any of the serving cells is configured with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus4set1,

$maxTd_2$ when any of the serving cells is configured with *dl-STTI-Length-r15* =subslot and *proc-Timeline-r15*=nplus6set2,

$maxTd_3$ when any of the serving cells is configured with *ShortProcessingTime =TRUE*,

$maxTd_4$ when any of the serving cells is configured with *dl-STTI-Length-r15*=slot,

$maxTd_5$ when any of the serving cells is configured with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus6set1,

$maxTd_6$ when any of the serving cells is configured with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus8set2.

The values of the parameters $maxTd_i$ for i=1,… ,6 are as specified in Table B.7.2-1.

**Table B.7.2-1: Maximum Subframe Timing Boundary Difference Between Earliest Uplink Carrier and Latest Downlink Carrier**

| Parameter | Value |
|---|---|
| $maxTd_1$ | 66.67 μs (Note 1) |
| $maxTd_2$ | 166.67 μs (Note 2) |
| $maxTd_3$ | 200.00 μs (Note 3) |
| $maxTd_4$ | 309.90 μs (Note 4) |
| $maxTd_5$ | 352.08 μs (Note 5) |
| $maxTd_6$ | 452.08 μs (Note 6) |

| | |
|---|---|
| Note 1: | Maximum timing advance with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus4set1 [16] |
| Note 2: | Maximum timing advance with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus6set2 [16] |
| Note 3: | Maximum timing advance with *ShortProcessingTime = TRUE* [16] |
| Note 4: | Maximum timing advance with *dl-STTI-Length-r15*=slot [16] |
| Note 5: | Maximum timing advance with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus6set1 [16] |
| Note 6: | Maximum timing advance with *dl-STTI-Length-r15*=subslot and *proc-Timeline-r15*=nplus8set2 [16] |

# Annex C (informative): Change history:

| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
|---|---|---|---|---|---|---|---|
| 2007-12 | RP#38 | RP-071037 | | | | Approved version in TSG RAN#38 | 8.0.0 |
| 2008-03 | RP#39 | RP-080123 | 2 | | | Updates of TS36.133 | 8.1.0 |
| 2008-05 | RP#40 | RP-080325 | 3 | | | Updates of TS36.133 | 8.2.0 |
| 2008-09 | RP#41 | RP-080644 | 006 | 1 | | E-UTRAN TDD intra frequency measurements when DRX is used | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 008 | 1 | | E-UTRAN TDD - UTRAN TDD measurements | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 012 | | | RSRQ reporting Range | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 018 | 1 | | Interfrequency and UTRA interRAT DRX peformance requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 020 | 1 | | Additions to UE transmit timing requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 043 | | | Received interference power measurement performance requirement | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 044 | | | Cell Synchronization requirement for E-UTRA TDD | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 047 | | | Power Headroom Requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080644 | 048 | | | Event Triggering and Reporting Criteria Capability Requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 004 | | | Correction of E-UTRAN to UTRAN TDD handover | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 016 | 1 | | Definition of Symbols | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 019 | 1 | | Idle mode requirements updates | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 021 | 1 | | General updates to 36.133 | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 023 | 1 | | Handover requirements for E-UTRAN to cdma200 HRPD/1x | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 024 | | | Inter-frequency and inter-RAT measurement requirements for multiple layer monitoring | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 025 | | | Side conditions for UE measurement procedures and measurement performance requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 026 | | | Correction to cell reselection Requirement from E-UTRAN to HRPD/cdma200 1x | 8.3.0 |
| 2008-09 | RP#41 | RP-080642 | 027 | | | IRAT Measurement requirements in TS 36.133 | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 022 | 1 | | Corrections to Handover requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 028 | | | Measurement reporting requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 029 | 2 | | RRC re-establishment requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 032 | | | Correction to UE measurement requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 033 | | | Correction for the definition of interruption time | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 040 | 1 | | Correction to idle mode higher priority search requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 045 | | | E-UTRAN TDD inter frequency measurement requirements | 8.3.0 |
| 2008-09 | RP#41 | RP-080713 | 046 | | | Updates of the Measurement procedures in RRC_Connected state from RAN 4#47bis and RAN 4#48 | 8.3.0 |
| 2008-12 | RP#42 | RP-080919 | 53 | | | Introduction of 700MHz Bands 12, 14 and 17 | 8.4.0 |
| 2008-12 | RP#42 | RP-080928 | 88 | 1 | | CR to 36.133 on Radio Link Failure Monitoring | 8.4.0 |
| 2008-12 | RP#42 | RP-080929 | 51 | | | Correction to idle mode requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080929 | 52 | | | Definition of out of service area | 8.4.0 |
| 2008-12 | RP#42 | RP-080929 | 54 | | | Measurement requirements for UTRAN TDD cells in idle state | 8.4.0 |
| 2008-12 | RP#42 | RP-080929 | 69 | 2 | | Correction of Inter-RAT UTRA cell reselection requirement | 8.4.0 |
| 2008-12 | RP#42 | RP-080929 | 55 | | | Correction of E_UTRAN cell measurement requirements in idle state | 8.4.0 |
| 2008-12 | RP#42 | RP-080930 | 76 | | | Correction to HO Requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080931 | 71 | | | Random access requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080932 | 85 | | | Cell phase synchronization error for large cell | 8.4.0 |
| 2008-12 | RP#42 | RP-080932 | 63 | 4 | | Synchronization Requirements for E-UTRAN to 1xRTT and HRPD Handovers | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 49 | | | E-UTRAN TDD-TDD intra/inter frequency measurement reporting requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 50 | | | E-UTRAN FDD – UTRAN FDD Measurement reporting requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 58 | | | Measurement requirement for E-UTRAN TDD to UTRAN TDD/FDD when DRX is used | 8.4.0 |

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|---|---|---|---|---|---|---|---|
| 2008-12 | RP#42 | RP-080933 | 60 | | | Interfrequency and GSM measurement performance requirements in large DRX | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 62 | | | Correction of implementation margin for transmission gap. | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 72 | | | Alignement of DRX cycle dependent requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 73 | 1 | | Alignement of side conditions for mobility measurements | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 66 | 1 | | Measurement models in RRC_CONNECTED | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 78 | 1 | | Limitation of maximum number of layers for multiple monitoring | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 83 | 1 | | GSM Cell identification requirements for parallel monitoring | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 87 | | | UE transmit timing requirement | 8.4.0 |
| 2008-12 | RP#42 | RP-080933 | 56 | | | Correction of TS 36.133 clause 8.1.2.1.1. | 8.4.0 |
| 2008-12 | RP#42 | RP-080934 | 77 | | | Correction to RSRQ Report Mapping | 8.4.0 |
| 2008-12 | RP#42 | | 86 | | | Missing side conditions for RSRP and RSRQ | 8.4.0 |
| 2008-12 | RP#42 | RP-080935 | 81 | 1 | | Phase I RRM Test Cases | 8.4.0 |
| 2008-12 | RP#42 | | 80 | 1 | | Test Configuration for RRM Tests: Measurement Reference Channels and OCNG | 8.4.0 |
| 2008-12 | RP#42 | RP-080936 | 75 | | | Cdma200 1xRTT Measurement Requirements | 8.4.0 |
| 2008-12 | RP#42 | RP-080937 | 74 | 1 | | E-UTRA to UTRA cell search requirements for SON | 8.4.0 |
| 2009-03 | RP#43 | RP-090182 | 101 | 1 | | Correction of A3-offset parameter in RRM test case | 8.5.0 |
| 2009-03 | RP#43 | RP-090182 | 105 | | | Some Editorial Corrections | 8.5.0 |
| 2009-03 | RP#43 | RP-090182 | 145 | | | Clarifications for the DRX state | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 89 | | | Modification on measurements of UTRAN TDD cells | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 91 | | | Clarification of the correct behavior when Treselection is not a multiple of idle mode reselection evaluation period | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 98 | | | Clarification of 'Out of Service Area' Concept and Definition | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 118 | | | Radio link monitoring | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 142 | 1 | | Update of RRC_IDLE state mobility side conditions | 8.5.0 |
| 2009-03 | RP#43 | RP-090183 | 150 | | | UE measurement capability in Idle mode | 8.5.0 |
| 2009-03 | RP#43 | RP-090184 | 133 | | | Removal of RRC re-establishment procedure delay | 8.5.0 |
| 2009-03 | RP#43 | RP-090184 | 138 | 1 | | Correction for the UE Re-establishment delay requirement | 8.5.0 |
| 2009-03 | RP#43 | RP-090185 | 92 | 2 | | Cell phase synchronization accuracy | 8.5.0 |
| 2009-03 | RP#43 | RP-090185 | 97 | | | Radio link monitoring in DRX | 8.5.0 |
| 2009-03 | RP#43 | RP-090185 | 120 | | | UE Transmit Timing | 8.5.0 |
| 2009-03 | RP#43 | RP-090185 | 137 | 1 | | Clarification of the reference point for the UE initial transmission timing control requirement | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 90 | | | Correction of clause 8.1.2.2.2.2 in TS36.133 | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 93 | 1 | | cdma2000 1xRTT and HRPD Measurement Requirements | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 94 | | | Event Triggered Periodic Reporting Requirements for IRAT Measurements | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 95 | | | Measurement Reporting Requirements for E-UTRAN TDD – UTRAN TDD Measurements | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 99 | 1 | | Clarification of UE behavior when measurement gap is used | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 100 | | | E-UTRA to UTRA cell search requirements in DRX for SON | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 110 | 1 | | Correction to GSM BSIC Requirements for Parallel Monitoring | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 117 | | | Alignment of terminology for GAP | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 134 | | | Inter frequency and Inter RAT cell search requirement when DRX is used | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 139 | | | Correction of E-UTRAN FDD – UTRAN FDD measurements when no DRX | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 146 | | | Addition of the definition of "when DRX is used" | 8.5.0 |
| 2009-03 | RP#43 | RP-090186 | 147 | 1 | | Corrections to E-UTRAN inter-frequency side conditions | 8.5.0 |
| 2009-03 | RP#43 | RP-090187 | 96 | | | Correction to Intra-frequency RSRP Accuracy Requirements | 8.5.0 |
| 2009-03 | RP#43 | RP-090187 | 136 | 1 | | Power Headroom reporting delay | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 103 | 1 | | E-UTRAN -GSM Handover Test Case | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 104 | 1 | | E-UTRAN FDD - UTRAN TDD Cell Search Test Cases in Fading | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 106 | 1 | | E-UTRA FDD to UTRA FDD Handover Test Case | 8.5.0 |

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|---|---|---|---|---|---|---|---|
| 2009-03 | RP#43 | RP-090370 | 107 | 1 | | Correction of E-UTRA FDD-FDD Intra-frequency cell reselection test case | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 108 | 1 | | Correction of E-UTRA FDD-FDD priority based Inter-frequency cell reselection test case | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 111 | | | E-UTRAN TDD - UTRAN FDD Handover Test Case | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 112 | 1 | | E-UTRAN FDD - GSM Cell Search Test Case in AWGN | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 113 | | | E-UTRAN - UTRAN FDD Cell Search Test Cases in Fading | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 114 | 1 | | E-UTRAN UE Timing Accuracy Related Test Cases | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 115 | 1 | | Inclusion of MBSFN Configurations for RRM Test Cases | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 116 | | | E-UTRAN FDD HRPD Cell Reselection Test Case; HRPD of Low Priority | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 122 | 1 | | Clarification on Annex A.9: Measurement performance requirements | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 125 | | | E-UTRA TDD – UTRA TDD cell reselection: UTRA is of higher priority | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 126 | | | E-UTRA TDD – UTRA TDD cell reselection: UTRA is of lower priority | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 127 | | | E-UTRA FDD – UTRA TDD cell reselection | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 128 | 1 | | E-UTRA TDD-UTRA TDD cell search (fading) | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 129 | 1 | | E-UTRA TDD-UTRA TDD handover | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 132 | 1 | | Addition of E-UTRA FDD to UTRA FDD reselection test cases | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 141 | 1 | | Correction and introduction of some test related parameters | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 143 | | | Description of Annex A in TS 36.133 | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 148 | | | Reselection from E-UTRA to GSM cell test case | 8.5.0 |
| 2009-03 | RP#43 | RP-090370 | 149 | | | Radio Link Monitoring Test Cases | 8.5.0 |
| 2009-05 | RP#44 | RP-090546 | 151 | | | E-UTRA FDD UTRA TDD HO delay test case | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 153 | | | Correction of CQI reporting periodicity for TDD RLM test cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 157 | | | Correction to inter RAT reselection requirements to exclude equal priority. (Technically Endorsed CR in R4-50bis - R4-091092) | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 167 | | | Clarification of the number of monitoring carriers in idle mode. (Technically Endorsed CR in R4-50bis - R4-091394) | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 180 | | | Correction of Core spec references in A.9 Measurements performance test cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 984 | | | UTRA FDD-E-UTRA FDD/ TDD handover test cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 184 | | | SON ANR UTRAN FDD Cell Search Test Case | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 187 | | | E-UTRAN FDD cdma2000 1x RTT Cell Reselection Test Case; Cdma2000 1X of Low Priority | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 188 | | | E-UTRAN FDD cdma2000 HO Test cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 190 | | | E-UTRAN Random Access Test Cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 191 | | | E-UTRAN RRC Re-establishment Test Cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 192 | | | E-UTRAN TDD - GSM Cell Search Test Case in AWGN | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 197 | | | Correction to E-UTRAN FDD - GSM Handover Test case | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 173 | 1 | | Correction of cell reselection test cases | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 179 | 1 | | Test cases of E-UTRA TDD intra-frequency cell search in fading environment when DRX is used | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 152 | 1 | | E-UTRA TDD GSM handover test case | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 178 | 1 | | Test cases of E-UTRA FDD intra-frequency cell search in fading environment when DRX is used | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 201 | 1 | | Test case for E-UTRA FDD E-UTRA FDD inter frequency cell search when DRX is used in fading conditions | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 185 | 1 | | Correction to Radio Link Monitoring Tests | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 203 | | | Correction to E-UTRAN FDD to HRPD Cell Reselection Test Case | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 177 | 1 | | Introduction of New Reference Channels and OCNG Patterns for 1.4MHz Bandwidth | 8.6.0 |
| 2009-05 | RP#44 | RP-090546 | 200 | 2 | | Test case for E-UTRA TDD E-UTRA TDD inter frequency cell search when DRX is used in fading conditions | 8.6.0 |
| 2009-05 | RP#44 | RP-090547 | 158 | | | Alignment of inter frequency and inter RAT RRM reselection testcases with core requirements. (Technically Endorsed CR in R4-50bis - R4-091094) | 8.6.0 |

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| 2009-05 | RP#44 | RP-090547 | 160 | | | Correction relating E-UTRAN TDD - UE Transmit Timing Accuracy Tests. (Technically Endorsed CR in R4-50bis - R4-091198) | 8.6.0 |
| 2009-05 | RP#44 | RP-090547 | 165 | | | Modifications of T3 and the verification point for in-sync test cases. (Technically Endorsed CR in R4-50bis - R4-091386) | 8.6.0 |
| 2009-05 | RP#44 | RP-090547 | 172 | | | E-UTRAN UE Timing Accuracy Related Test Cases. (Technically Endorsed CR in R4-50bis - R4-091517) | 8.6.0 |
| 2009-05 | RP#44 | RP-090547 | 171 | 1 | | Reference measurement Channels for Radio Link Monitoring Tests with 2 Antennas. (Technically Endorsed CR in R4-50bis - R4-091508) | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 170 | | | Misalignment between TS36.133 and TS36.321. (Technically Endorsed CR in R4-50bis - R4-091457) | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 193 | | | Correction to Inter-RAT HO Interruption Time Definition | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 195 | | | CR c2k RRC delay | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 196 | | | CR c2k interruption time | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 162 | | | Clarifications to UE UL timing requirements. (Technically Endorsed CR in R4-50bis - R4-091357) | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 176 | | | Corrections of Random Access Requirements | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 154 | | | Correction of TGRP in clause 8.1.2.1.1 | 8.6.0 |
| 2009-05 | RP#44 | RP-090548 | 168 | | | Clarifications for the Relative RSRP and RSRQ measurement requirements. (Technically Endorsed CR in R4-50bis - R4-091407) | 8.6.0 |
| 2009-05 | RP#44 | RP-090549 | 161 | | | E-UTRAN UTRAN HO Command Processing Delay. (Technically Endorsed CR in R4-50bis - R4-091291) | 8.6.0 |
| 2009-05 | RP#44 | RP-090549 | 175 | | | Corrections of Cell Reselection Requirements in Idle Mode | 8.6.0 |
| 2009-05 | RP#44 | RP-090549 | 181 | 2 | | Removal of [ ] from ranking criteria in Idle mode cell reselection | 8.6.0 |
| 2009-05 | RP#44 | RP-090550 | 156 | | | Correction on the TDD-TDD inter frequency measurements. (Technically Endorsed CR in R4-50bis - R4-091071) | 8.6.0 |
| 2009-05 | RP#44 | RP-090550 | 159 | | | Correction to the Referenced Clause Number for Tinter1. (Technically Endorsed CR in R4-50bis - R4-091153) | 8.6.0 |
| 2009-05 | RP#44 | RP-090551 | 166 | | | Further clarification of DRX/Non-DRX state. (Technically Endorsed CR in R4-50bis - R4-091389) | 8.6.0 |
| 2009-05 | RP#44 | RP-090551 | 202 | | | Correction on reference to 3GPP2 specification | 8.6.0 |
| 2009-05 | RP#44 | RP-090551 | 169 | | | OCNG simplification. (Technically Endorsed CR in R4-50bis - R4-091410) | 8.6.0 |
| 2009-05 | RP#44 | RP-090559 | 155 | | | Introduction of Extended LTE800 requirements. (Technically Endorsed CR in R4-50bis - R4-091063) | 9.0.0 |
| 2009-05 | RP#45 | RP-090817 | 211 | | | Correction to TDD RMC references in RLM test cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 205 | | | Introduction of Reference DRX configurations | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 207 | | | Addition of DRX configurations into non DRX test cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 225 | | | Correction to HO Test Cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 227 | | | Correction to E-UTRAN GSM BSIC Identification Requirements with DRX | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 259 | | | Corrections of Test Cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 314 | | | E-UTRA FDD - E-UTRA FDD and UTRA FDD cell search test cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 315 | | | E-UTRAN Radio Link Monitoring Test Cases in DRX | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 316 | | | Inter-frequency E-UTRA - E-UTRA HO test cases: unknown target cell | 9.1.0 |
| 2009-05 | RP#45 | RP-090880 | 263 | 2 | | E-UTRA FDD UTRA FDD Blind Handover test case: unknown target cell | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 321 | 1 | | Small corrections to Measurements performance tests parameters | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 285 | 1 | | E-UTRAN GSM Cell Search in DRX Test Cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 267 | | | Set 3.2. E-UTRA TDD to UTRA TDD cell search in DRX under fading | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 269 | | | Set 3.6. Test case of E-UTRA TDD to E-UTRA TDD and UTRA TDD combined cell search under fading | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 271 | | | Set 3.12. E-UTRA TDD to UTRA TDD blind handover test | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 279 | | | E-UTRAN FDD - UTRAN FDD Cell Search in DRX Test Cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 281 | | | E-UTRAN TDD- E-UTRAN TDD and E-UTRAN TDD Inter-frequency Cell Search Test Case | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 283 | | | E-UTRAN GSM Blind Handover Test Cases | 9.1.0 |

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| 2009-05 | RP#45 | RP-090836 | 287 | | | E-UTRAN FDD cdma2000 Blind HO Test cases | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 302 | | | RRM Test case for multiple E-UTRAN FDD-FDD Inter-frequency event triggered reporting under fading propagation conditions | 9.1.0 |
| 2009-05 | RP#45 | RP-090836 | 304 | | | Fading reselection test case between E-UTRA and UTRA (UTRA of lower priority | 9.1.0 |
| 2009-05 | RP#45 | RP-090828 | 233 | | | CR SI HRPD correction | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 215 | 1 | | Corrections to Measurements of HRPD cells and cdma2000 1X | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 231 | | | CR reference correction | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 235 | 1 | | Corrections to Measurements of GSM cells in RRC_IDLE | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 247 | | | Range of Idle Mode Es/Iot side conditions | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 249 | | | Removal of [ ] from Tdetect, Tmeasure and Tevaluate | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 245 | 1 | | Clarification to applicability of RSRP side conditions in Idle mode | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 317 | | | CR Idle mode IF measurement condition | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 318 | | | CR Idle mode IF measurement period | 9.1.0 |
| 2009-05 | RP#45 | RP-090879 | 217 | 2 | | Corrections to E-UTRAN RRC_IDLE state mobility requirements | 9.1.0 |
| 2009-05 | RP#45 | RP-090814 | 265 | 1 | | Correction to Random Access | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 221 | | | E-UTRAN TDD-TDD inter frequency cell search/measurement requirements when DRX is used | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 223 | | | E-UTRAN inter RAT measurement requirements | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 229 | | | Correction to Monitoring of Multiple Layers Using Gaps | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 219 | 1 | | E-UTRAN FDD-FDD inter frequency measurements when DRX is used | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 322 | | | CR GSM measurement period | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 323 | | | CR cdma2000 1x and HRPD number of carriers | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 213 | 1 | | Editorial correction on E-UTRAN inter frequency measurements | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 261 | 1 | | E-UTRAN TDD intra frequency measurements | 9.1.0 |
| 2009-05 | RP#45 | RP-090816 | 319 | 1 | | Clarification of the number of monitoring cells for intra frequency measurements | 9.1.0 |
| 2009-05 | RP#45 | RP-090815 | 237 | | | Correction of timing advance adjustment accuracy test case | 9.1.0 |
| 2009-05 | RP#45 | RP-090815 | 291 | | | Correction to UE Transmit Timing Requirements | 9.1.0 |
| 2009-12 | RP-46 | RP-091275 | 329 | | | Defining requirements for UTRA TDD measurements for SON (Technically endorsed at RAN 4 52bis in R4-093512) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 332 | | | Modification of test case of E-UTRA TDD intra frequency cell reselection (Technically endorsed at RAN 4 52bis in R4-093552) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 333 | | | Modification of test case of E-UTRA TDD inter frequency cell reselection (Technically endorsed at RAN 4 52bis in R4-093553) | 9.2.0 |
| 2009-12 | RP-46 | RP-091286 | 334 | | | Introduction of Extended LTE1500 requirements for TS36.133 (Technically endorsed at RAN 4 52bis in R4-093636) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 336 | | | Addition of E-UTRA TDD to UTRA FDD reselection test cases (Technically endorsed at RAN 4 52bis in R4-093686) | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 338 | | | Correction of missing accuracy requirements for UTRAN FDD (Technically endorsed at RAN 4 52bis in R4-093689) | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 340 | | | CR cdma2000 HRPD measurement period (Technically endorsed at RAN 4 52bis in R4-093720) | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 342 | | | CR cdma2000 1x measurement period (Technically endorsed at RAN 4 52bis in R4-093721) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 344 | | | Correction for E-UTRAN FDD - UTRAN FDD Cell Search in DRX Test Cases (Technically endorsed at RAN 4 52bis in R4-093890) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 346 | | | Revise geometry factors for Intra freq Reselection Test Cases | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 348 | | | Corrections on RRM parameters for Bands 12, 14, 17 | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 351 | 1 | | Corrections to PDSCH RMC-s | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 353 | | | Corrections of TS36.133 | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 356 | 1 | | UTRA TDD P-CCPCH RSCP absolute accuracy measurement in E-UTRAN | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 358 | 1 | | E-UTRAN TDD - UTRAN TDD cell search for SON | 9.2.0 |

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| 2009-12 | RP-46 | RP-091275 | 361 | | | Cell Search Requirements for Intra-LTE Handover to Unknown Target Cell | 9.2.0 |
| 2009-12 | RP-46 | RP-091273 | 365 | | | Combined E-UTRAN interfrequency and GSM cell search test cases (Scenario set 3.2) | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 367 | 1 | | Correction in UE UTRA TDD P-CCPCH RSCP measurement capability for R9 | 9.2.0 |
| 2009-12 | RP-46 | RP-091273 | 374 | | | E-UTRAN GSM RSSI Measurement Accuracy Tests | 9.2.0 |
| 2009-12 | RP-46 | RP-091273 | 375 | | | E-UTRAN UTRAN FDD CPICH RSCP Measurement Accuracy Tests | 9.2.0 |
| 2009-12 | RP-46 | RP-091273 | 376 | | | E-UTRAN UTRAN FDD CPICH Ec/No Measurement Accuracy Tests | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 378 | | | Cell Timing Change Requirements for Event Triggered Reporting | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 380 | | | Correction to Power Headroom Requirements | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 382 | | | Editorial corrections to 36.133 | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 387 | | | Editorial corrections to the time units for RRC Re-establishment test cases | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 389 | 1 | | Introduction of cell search test case in DRX to verify L3 filtering | 9.2.0 |
| 2009-12 | RP-46 | RP-091271 | 391 | | | Correction to ONCG Patterns | 9.2.0 |
| 2009-12 | RP-46 | RP-091275 | 329 | | | Defining requirements for UTRA TDD measurements for SON (Technically endorsed at RAN 4 52bis in R4-093512) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 332 | | | Modification of test case of E-UTRA TDD intra frequency cell reselection (Technically endorsed at RAN 4 52bis in R4-093552) | 9.2.0 |
| 2009-12 | RP-46 | RP-091272 | 333 | | | Modification of test case of E-UTRA TDD inter frequency cell reselection (Technically endorsed at RAN 4 52bis in R4-093553) | 9.2.0 |
| 2010-03 | RP-47 | RP-100254 | 410 | | | Idle mode corrections | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 405 | 1 | | UE measurement capability requirements in Idle and Connected | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 423 | | | Correction to UE Measurement Capability Requirements in Idle Mode | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 412 | | | Removal of activation time from interRAT handover requirements | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 417 | 1 | | Correction to UE Transmit Timing Requirements | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 402 | | | Correction of E-UTRAN TDD inter frequency measurements_R9 | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 414 | 1 | | Enhanced GSM Requirements for CSFB | 9.3.0 |
| 2010-03 | RP-47 | RP-100254 | 415 | 1 | | Enhanced UTRA FDD Requirements for CSFB | 9.3.0 |
| 2010-03 | RP-47 | RP-100255 | 399 | | | Correction of RSRP value in E-UTRAN FDDFDD Inter frequency reselection test | 9.3.0 |
| 2010-03 | RP-47 | RP-100255 | 397 | | | Addition of missing Es/Noc parameters in RRM test cases | 9.3.0 |
| 2010-03 | RP-47 | RP-100255 | 421 | | | Correction to RRC Re-establishment Test Case | 9.3.0 |
| 2010-03 | RP-47 | RP-100255 | 427 | 1 | | Correction of UE transmit timing test case | 9.3.0 |
| 2010-03 | RP-47 | RP-100255 | 419 | 1 | | Correction to RLM Test Cases | 9.3.0 |
| 2010-03 | RP-47 | RP-100262 | 407 | | | Editorial Corrections in TS36.133(Rel-9) | 9.3.0 |
| 2010-03 | RP-47 | RP-100263 | 413 | | | Introduction of LTE in 800 MHz for Europe requirements in TS 36.133 | 9.3.0 |
| 2010-03 | RP-47 | RP-100264 | 395 | | | Corrections for Extended UMTS1500 in TS36.133(Rel-9) | 9.3.0 |
| 2010-03 | RP-47 | RP-100269 | 393 | | | AOA and TA measurement report mappings | 9.3.0 |
| 2010-03 | RP-47 | RP-100269 | 403 | 2 | | Mapping of UE RxTx time difference measurement | 9.3.0 |
| 2010-03 | RP-47 | RP-100266 | 425 | 2 | | Home eNode B synchronization requirement | 9.3.0 |
| 2010-03 | RP-47 | RP-100266 | 424 | 2 | | Minimum requirements on SI reading for HeNB inbound mobility | 9.3.0 |
| 2010-06 | RP-48 | RP-100622 | 473 | | | Clarification on radio link monitoring | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 472 | | | Corrections of clause numbering on the test case of E-UTRAN FDD-FDD inter-frequency cell search requirements for L3 fitering | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 466 | 1 | | Correction to RRM Test Cases | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 464 | | | Correction to RRM Requirements | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 462 | 1 | | Correction to Absolute RSRP/RSRQ Definitions | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 457 | | | UE Measurement Capability Requirements for CDMA2000 | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 455 | 1 | | Correction of E-UTRAN Inter-frequency Cell Re-selection Requirements | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 451 | 1 | | Correction to idle mode requirements(Rel-9) | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 449 | 1 | | Editorial corrections to 36.133(Rel-9) | 9.4.0 |
| 2010-06 | RP-48 | RP-100622 | 447 | | | Correction to TDD intrafrequency accuracy test case | 9.4.0 |

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| 2010-06 | RP-48 | RP-100622 | 441 | 1 | | Correction of Io value in E-UTRAN FDD and TDD Inter frequency RSRP tests | 9.4.0 |
| 2010-06 | RP-48 | RP-100627 | 444 | 2 | | Corrections to CSG SI reading core requirement | 9.4.0 |
| 2010-06 | RP-48 | RP-100627 | 445 | 1 | | RSRQ idle mode requirements | 9.4.0 |
| 2010-06 | RP-48 | RP-100630 | 470 | 1 | | Test cases for R9 cell reselection enhancements | 9.4.0 |
| 2010-06 | RP-48 | RP-100630 | 460 | | | Missing E-UTRA - UTRA FDD DRX Requirements | 9.4.0 |
| 2010-06 | RP-48 | RP-100631 | 442 | 2 | | Corrections to enhanced cell identification core requirement | 9.4.0 |
| 2010-06 | RP-48 | RP-100632 | 469 | | | Applicability of mobility requirements with inter-frequency RSTD measurements | 9.4.0 |
| 2010-06 | RP-48 | RP-100632 | 439 | | | UE Rx-Tx Time Difference Measurement Requirements for E-CID | 9.4.0 |
| 2010-06 | RP-48 | RP-100632 | 438 | 2 | | CR UE RX-TX time-difference measurement requirement | 9.4.0 |
| 2010-06 | RP-48 | RP-100632 | 433 | 5 | | RSTD Measurement Requirements for OTDOA | 9.4.0 |
| 2010-06 | RP-48 | RP-100632 | 432 | 5 | | RSTD Accuracy Requirements for OTDOA | 9.4.0 |
| 2010-09 | RP-49 | RP-100914 | 477 | 1 | | Cell identity change time in RRM Test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 537 | | | A clarification text in the RSTD intra-frequency accuracy requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 506 | | | Correction of drx-RetransmissionTimer parameters | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 508 | | | Correction of Io value in RSRP FDD and TDD Intra frequency test | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 521 | 1 | | Editorial corrections to 36.133 (R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 523 | | | Alignment of REFSENS between 36.101 and 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 525 | 1 | | Correction of Time to Trigger unit for 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 505 | 1 | | Corrections to 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 528 | 1 | | E-UTRAN FDD Intra Frequency RSTD Measurement Accuracy test case | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 538 | 1 | | Correction to Enhanced BSIC Verification Requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 539 | | | Enhanced CSFB Requirements with DRX | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 540 | | | Correction to E-CID Requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 544 | 1 | | Addition of UTRA and GSM enhanced cell identification test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 547 | 1 | | E-UTRAN FDD UE Rx – Tx Time Difference Measurement Accuracy test case | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 479 | 1 | | Scrambling code change time in RRM Test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 549 | | | Introduction of CSG cell reselection requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 527 | | | correction of redundant Hysteresis(Hys) for 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 488 | 2 | | Test case for TDD UE Rx-Tx time difference measurement | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 483 | | | Clarification of Radio link monitoring test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 485 | | | Test case for E-UTRA TDD event triggered reporting when L3 filtering is used in R9 | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 487 | | | E-UTRA TDD - UTRA TDD cell reselection in fading propagation conditions: UTRA TDD is of lower priority in R9 | 9.5.0 |
| 2010-09 | RP-49 | RP-100924 | 492 | | | Test case for E-UTRAN TDD in the existence of non-allowed CSG cell | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 494 | | | PDCCH Aggregation level for RRM tests | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 503 | | | Correction of ES/Iot value in E-UTRAN RSRQ FDD intra frequency test | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 496 | | | Corrections to RRM OCNG Patterns | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 498 | | | RRC timer accuracy requirement | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 501 | | | Correction of OCNG | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 477 | 1 | | Cell identity change time in RRM Test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 537 | | | A clarification text in the RSTD intra-frequency accuracy requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 506 | | | Correction of drx-RetransmissionTimer parameters | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 508 | | | Correction of Io value in RSRP FDD and TDD Intra frequency test | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 521 | 1 | | Editorial corrections to 36.133 (R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 523 | | | Alignment of REFSENS between 36.101 and 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 525 | 1 | | Correction of Time to Trigger unit for 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 505 | 1 | | Corrections to 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 528 | 1 | | E-UTRAN FDD Intra Frequency RSTD Measurement Accuracy test case | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 538 | 1 | | Correction to Enhanced BSIC Verification Requirements | 9.5.0 |

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|---|---|---|---|---|---|---|---|
| 2010-09 | RP-49 | RP-100919 | 539 | | | Enhanced CSFB Requirements with DRX | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 540 | | | Correction to E-CID Requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 544 | 1 | | Addition of UTRA and GSM enhanced cell identification test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 547 | 1 | | E-UTRAN FDD UE Rx – Tx Time Difference Measurement Accuracy test case | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 479 | 1 | | Scrambling code change time in RRM Test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 549 | | | Introduction of CSG cell reselection requirements | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 527 | | | correction of redundant Hysteresis(Hys) for 36.133(R9) | 9.5.0 |
| 2010-09 | RP-49 | RP-100920 | 488 | 2 | | Test case for TDD UE Rx-Tx time difference measurement | 9.5.0 |
| 2010-09 | RP-49 | RP-100914 | 483 | | | Clarification of Radio link monitoring test cases | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 485 | | | Test case for E-UTRA TDD event triggered reporting when L3 filtering is used in R9 | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 487 | | | E-UTRA TDD - UTRA TDD cell reselection in fading propagation conditions: UTRA TDD is of lower priority in R9 | 9.5.0 |
| 2010-09 | RP-49 | RP-100924 | 492 | | | Test case for E-UTRAN TDD in the existence of non-allowed CSG cell | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 494 | | | PDCCH Aggregation level for RRM tests | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 503 | | | Correction of ES/Iot value in E-UTRAN RSRQ FDD intra frequency test | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 496 | | | Corrections to RRM OCNG Patterns | 9.5.0 |
| 2010-09 | RP-49 | RP-100919 | 498 | | | RRC timer accuracy requirement | 9.5.0 |
| 2010-09 | RP-49 | RP-100915 | 501 | | | Correction of OCNG | 9.5.0 |
| 2010-09 | RP-49 | RP-100927 | 497 | | | CR LTE_TDD_2600_US spectrum band definition additions to TS 36.133 | 10.0.0 |
| 2010-12 | RP-50 | RP-101331 | 635 | | | Corrections to 36.133 performance requirements | 10.1.0 |
| 2010-12 | RP-50 | RP-101331 | 638 | | | Correction to intra frequency cell identification time for FDD and TDD | 10.1.0 |
| 2010-12 | RP-50 | RP-101331 | 566 | 1 | | Corrections and Clarifications to TS36.133 | 10.1.0 |
| 2010-12 | RP-50 | RP-101331 | 592 | 2 | | Correction to Radio link monitoring test cases | 10.1.0 |
| 2010-12 | RP-50 | RP-101332 | 563 | | | PDCCH Aggregation Level for RRM Tests | 10.1.0 |
| 2010-12 | RP-50 | RP-101332 | 571 | | | MIMO correlation scenario for RLM test cases | 10.1.0 |
| 2010-12 | RP-50 | RP-101332 | 580 | | | Removal of [ ] from PDSCH and PCFICH/PDCCH/PHICH Measurement Channel references in Annex A. | 10.1.0 |
| 2010-12 | RP-50 | RP-101332 | 585 | | | Enabling HARQ for RRM Tests | 10.1.0 |
| 2010-12 | RP-50 | RP-101335 | 643 | 1 | | Completion of CSG cell reselection requirements | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 568 | | | Clarification of measurements requirements for HRPD and cdma2000 1x | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 589 | | | Addition of Band 18, 19 and 21 into UE Rx - Tx time difference requirements | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 604 | | | Correction to Enhanced GSM Cell Identification Requirement | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 632 | | | Correction of reselection requirement for UTRAN FDD cells | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 640 | | | Correction to Enhanced UTRA FDD Cell Identification Requirements | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 645 | | | E-UTRAN TDD Intra Frequency RSTD Measurement Accuracy test case | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 621 | 1 | | Correction for Measurements of inter-RAT cells | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 598 | 2 | | E-UTRAN FDD intra-frequency RSTD measurement reporting delay test case | 10.1.0 |
| 2010-12 | RP-50 | RP-101343 | 600 | 2 | | E-UTRAN TDD intra-frequency RSTD measurement reporting delay test case | 10.1.0 |
| 2010-12 | RP-50 | RP-101356 | 644 | | | Band 42 and 43 parameters for UMTS/LTE 3500 (TDD) for TS 36.133 | 10.1.0 |
| 2010-12 | RP-50 | RP-101361 | 552 | | | Introduction of L-band in TS36.133 | 10.1.0 |
| 2010-12 | RP-50 | RP-101388 | 648 | | | Removal of square brackets from scope of TS36.133 | 10.1.0 |
| 2011-04 | RP-51 | RP-110359 | 0658 | - | | Addition of UE RRM capabilities for CA | 10.2.0 |
| 2011-04 | RP-51 | RP-110340 | 0663 | - | | Correction to E-UTRAN TDD in-sync test requirements | 10.2.0 |
| 2011-04 | RP-51 | RP-110348 | 0665 | 1 | | RSTD requirements, RMC and OCNG patterns | 10.2.0 |
| 2011-04 | RP-51 | RP-110350 | 0669 | - | | CR to 36.133: Aligning relavant RRM requirements for Band 41 with the reference sensitivity values in 36.101 | 10.2.0 |
| 2011-04 | RP-51 | RP-110339 | 0676 | - | | Modification on test case of E-UTRA TDD to UTRA TDD cell reselection(R10) | 10.2.0 |
| 2011-04 | RP-51 | RP-110339 | 0681 | 1 | | Value of MS_TXPWR_MAX_CCH for EUTRA-GSM reselection test cases A.4.4.x | 10.2.0 |

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|---|---|---|---|---|---|---|---|
| 2011-04 | RP-51 | RP-110339 | 0687 | 1 | | Rearrangement of Time periods for EUTRA-UTRA reselection test case A.4.3.1.1 | 10.2.0 |
| 2011-04 | RP-51 | RP-110339 | 0690 | 1 | | Removal of "Force to Cell 2" during initialisation for EUTRA-UTRA reselection test case A.4.3.1.2 | 10.2.0 |
| 2011-04 | RP-51 | RP-110340 | 0693 | 1 | | SNR for RRM A.8.x test cases using ETU70 | 10.2.0 |
| 2011-04 | RP-51 | RP-110408 | 0697 | 1 | | Requirements for Minimaztion of Drive Tests (MDT) in LTE | |
| 2011-04 | RP-51 | RP-110339 | 0703 | - | | Correction to test cases of E-UTRA to UTRA cell reselection when UE is in idle state | 10.2.0 |
| 2011-04 | RP-51 | RP-110359 | 0706 | 2 | | Introduction of measurement requirements for carrier aggregation | 10.2.0 |
| 2011-04 | RP-51 | RP-110347 | 0709 | 1 | | Addition of test cases for FDD intra-frequency SI reading using autonomous gaps with both non DRX and DRX for Rel-10 | 10.2.0 |
| 2011-04 | RP-51 | RP-110347 | 0711 | 1 | | Addition of test cases for FDD inter-frequency SI reading using autonomous gaps with both non DRX and DRX for Rel-10 | 10.2.0 |
| 2011-04 | RP-51 | RP-110359 | 0713 | 1 | | Introduction of core requirements of radio link monitoring in CA | 10.2.0 |
| 2011-04 | RP-51 | RP-110339 | 0719 | 1 | | Modification on Test Requirements in E-UTRA - UTRA TDD SON Test Case (A.8.7.3) (R10) | 10.2.0 |
| 2011-04 | RP-51 | RP-110348 | 0727 | 2 | | Requirements for reporting criteria with positioning measurements | 10.2.0 |
| 2011-04 | RP-51 | RP-110340 | 0736 | - | | Correction of RLM evaluation period in DRX | 10.2.0 |
| 2011-04 | RP-51 | RP-110340 | 0739 | - | | Correction of inter-frequency measurement accuracy test cases | 10.2.0 |
| 2011-04 | RP-51 | RP-110339 | 0744 | - | | Modification on Test Requirements in E-UTRA GSM cell reselection Test Case (A.4.4) (R10) | 10.2.0 |
| 2011-04 | RP-51 | RP-110348 | 0747 | 1 | | Corrections to RSTD measurement for Rel-9 | 10.2.0 |
| 2011-04 | RP-51 | RP-110348 | 0748 | - | | Correction on FDD Intra Frequency RSTD Measurement Accuracy test case | 10.2.0 |
| 2011-04 | RP-51 | RP-110348 | 0751 | 1 | | RSTD test case corrections | 10.2.0 |
| 2011-04 | RP-51 | RP-110344 | 0753 | - | | Correction of serving cell performance requirements for autonomous SI acquisition | 10.2.0 |
| 2011-06 | RP-52 | RP-110753 | 0785 | 1 | | Simplification of frequency dependent requirements in 36.133<br>(Table B.2.2-1 contains erroneous values. These wrong values will be corrected in the RAN#53 meeting.) | 10.3.0 |
| 2011-06 | RP-52 | RP-110793 | 754 | | | E-UTRAN FDD-FDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency | 10.3.0 |
| 2011-06 | RP-52 | RP-110793 | 755 | | | E-UTRAN TDD-TDD inter-frequency RSTD measurement reporting delay test case with the reference cell on the serving carrier frequency | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 757 | | | Core requirements on RRC connection mobility control in CA | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 758 | | | Timing core requirements in CA | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 759 | | | Introduction of Handover Requirements for Carrier Aggregation | 10.3.0 |
| 2011-06 | RP-52 | RP-110793 | 760 | | | E-UTRAN FDD Inter Frequency RSTD Measurement Accuracy test case | 10.3.0 |
| 2011-06 | RP-52 | RP-110793 | 761 | | | E-UTRAN TDD Inter Frequency RSTD Measurement Accuracy test case | 10.3.0 |
| 2011-06 | RP-52 | RP-110786 | 765 | | | Rearrangement of Time periods for EUTRA-UTRA reselection test case A.4.3.4.1 | 10.3.0 |
| 2011-06 | RP-52 | RP-110786 | 768 | | | Removal of "Force to Cell 2" during initialisation for EUTRA -UTRA reselection test cases | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 776 | | | Introduction of UE interruption requirements in SCC measurements with de-activated SCell | 10.3.0 |
| 2011-06 | RP-52 | RP-110794 | 797 | | | Editorial Correction to Cell Re-selection Requirements | 10.3.0 |
| 2011-06 | RP-52 | RP-110789 | 808 | | | Correction to side conditions for TDD inter-frequency CGI identification for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110786 | 814 | | | Correction to inter-RAT cell identificiation time in DRX for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110787 | 817 | | | Correction to identification time of UTRA FDD cell for SON in DRX for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110787 | 822 | | | Correction to requirements of E-UTRAN TDDUTRAN TDD measurements for SON when DRX is used for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 829 | | | Corrrection to the side condition for measurements for E-UTRA carrier aggregation | 10.3.0 |
| 2011-06 | RP-52 | RP-110803 | 850 | | | CR Timestamp accuracy requirements for MDT | 10.3.0 |

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|---|---|---|---|---|---|---|---|
| 2011-06 | RP-52 | RP-110812 | 778 | 1 | | Add 2GHz S-Band (Band 23) in 36.133 | 10.3.0 |
| 2011-06 | RP-52 | RP-110796 | 787 | 1 | | Clarification on inter-frequency layers for RSTD | 10.3.0 |
| 2011-06 | RP-52 | RP-110794 | 780 | 1 | | Correction to RSTD measurement for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 852 | 1 | | Pcmax,c mapping | 10.3.0 |
| 2011-06 | RP-52 | RP-110787 | 771 | 1 | | Clarification of Radio link monitoring test requirements<br>(The CR was not implemented as it is not based on the latest version of the specification) | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 793 | 1 | | E-CID Measurement Requirements under Pcell Switching | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 775 | 1 | | Removal of undefined intra-freq RSRQ relative accuracy requirements in CA | 10.3.0 |
| 2011-06 | RP-52 | RP-110789 | 856 | | | Correction on E-UTRAN FDD RSTD intra frequency case | 10.3.0 |
| 2011-06 | RP-52 | RP-110796 | 800 | 1 | | Addition of E-UTRAN FDD/TDD cdma2000 1xRTT measurements requirement for SON for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110790 | 804 | 1 | | Addition of test cases for TDD intra-frequency SI reading using autonomous gaps with both non DRX and DRX for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110790 | 806 | 1 | | Addition of test cases for TDD inter-frequency SI reading using autonomous gaps with both non DRX and DRX for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110787 | 828 | 1 | | Addition of missing EsNoc parameters in E-UTRAN TDD UTRAN TDD Measurements test cases for Rel-10 | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 835 | 1 | | Clarification of UE Rx-Tx time difference measurement requirement for carrier aggregation | 10.3.0 |
| 2011-06 | RP-52 | RP-110804 | 859 | | | Expanded 1900 MHz addition to 36.133 | 10.3.0 |
| 2011-06 | RP-52 | RP-110811 | 860 | | | Introduction of RLM requirement for eICIC | 10.3.0 |
| 2011-06 | RP-52 | RP-110796 | 794 | 1 | | E-CID Measurement Requirements under Handover | 10.3.0 |
| 2011-06 | RP-52 | RP-110811 | 762 | 1 | | CR on RLM requirements for eICIC | 10.3.0 |
| 2011-06 | RP-52 | RP-110811 | 788 | 2 | | RSRP and RSRQ measurement requirements for eICIC | 10.3.0 |
| 2011-06 | RP-52 | RP-110811 | 851 | 1 | | CR on RSRP and RSRQ measurement accuracy requirements for eICIC | 10.3.0 |
| 2011-06 | RP-52 | RP-110807 | 802 | 2 | | Addition of OTDOA measurement requirement for E-UTRAN carrier aggregation | 10.3.0 |
| 2011-09 | RP-53 | RP-111246 | 863 | | | Thresholds and margins for reporting of neighbour cells in RRM test A.8.9.1 | 10.4.0 |
| 2011-09 | RP-53 | RP-111246 | 902 | | | Thresholds and margins for RRM tests A.5.2.1 and A.5.2.2 | 10.4.0 |
| 2011-09 | RP-53 | RP-111246 | 905 | | | Thresholds and margins for RRM tests A.5.2.4 and A.5.2.5 | 10.4.0 |
| 2011-09 | RP-53 | RP-111247 | 889 | | | Removing [] in clause 8.1.2.2.2.2 for Rel-10 | 10.4.0 |
| 2011-09 | RP-53 | RP-111247 | 915 | | | Adding condition of UTRA TDD measurement report delay requirements applied | 10.4.0 |
| 2011-09 | RP-53 | RP-111247 | 930 | | | Clarify time points and time duration for RLM tests A.7.3.x | 10.4.0 |
| 2011-09 | RP-53 | RP-111251 | 926 | 1 | | Adding enhanced UTRA TDD cell identification requirements for Rel-10 | 10.4.0 |
| 2011-09 | RP-53 | RP-111251 | 969 | | | CR for E-UTRAN FDD GSM event triggered reporting in AWGN with enhanced BSIC identification in R10 | 10.4.0 |
| 2011-09 | RP-53 | RP-111252 | 894 | | | Requirements for RRC Connection Release with Redirection | 10.4.0 |
| 2011-09 | RP-53 | RP-111252 | 960 | | | Missing RSRQ in Intra-frequency measurement requirements | 10.4.0 |
| 2011-09 | RP-53 | RP-111252 | 965 | 1 | | Requirements for RRC Connection Release with Redirection for TDD in R10 | 10.4.0 |
| 2011-09 | RP-53 | RP-111255 | 946 | | | Introduction of Band 22 | 10.4.0 |
| 2011-09 | RP-53 | RP-111255 | 979 | 1 | | Modifications of Band 42 and 43 | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 879 | 1 | | Correction to RRC connection mobility control in CA | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 895 | 2 | | RSTD Measurement Requirements under Handover | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 896 | 2 | | RSTD Measurement Requirements under Pcell Switching | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 920 | 1 | | Editorial corrections for 36.133 (Rel-10) | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 924 | 1 | | Correction to RRC connection mobility control in CA | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 927 | | | Modifications on TDD inter frequency measurements with autonomous gaps | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 945 | 1 | | Frequency band related requirements to 36.133 | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 949 | 1 | | Correction of references | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 950 | | | Alignment of the carrier aggregation terminology | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 951 | | | Band simplification for core requirements | 10.4.0 |

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|---|---|---|---|---|---|---|---|
| 2011-09 | RP-53 | RP-111263 | 952 | | | Clarification in inter-frequency RSTD accuracy tests | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 953 | 1 | | Editorial corrections for RRM requirements | 10.4.0 |
| 2011-09 | RP-53 | RP-111263 | 961 | | | Missing RSRQ in E-UTRA carrier aggregation measurement requirements | 10.4.0 |
| 2011-09 | RP-53 | RP-111265 | 874 | 1 | | Clarification of TDD uplink-downlink subframe configurations applicability for RSTD measurement in CA | 10.4.0 |
| 2011-09 | RP-53 | RP-111265 | 875 | 3 | | CR on UE interruption requirements in SCC measurements with de-activated SCell when common DRX is used | 10.4.0 |
| 2011-09 | RP-53 | RP-111265 | 883 | 1 | | Alignment of terminology for SCell measurement cycle | 10.4.0 |
| 2011-09 | RP-53 | RP-111265 | 921 | 1 | | Introduction of Pcmax,c reporting requirements for carrier aggregation | 10.4.0 |
| 2011-09 | RP-53 | RP-111266 | 849 | 3 | | RSTD Accuracy Requirements for Carrier Aggregation | 10.4.0 |
| 2011-09 | RP-53 | RP-111266 | 898 | 1 | | Introduction of power headroom reporting requirement for carrier aggregation | 10.4.0 |
| 2011-09 | RP-53 | RP-111308 | 891 | 1 | | RSRP and RSRQ measurement requirements for eICIC | 10.4.0 |
| 2011-12 | RP-54 | RP-111681 | 982 | | | Corrections of inter-frequency measurement accuracy RSRP and RSRQ test cases | 10.5.0 |
| 2011-12 | RP-54 | RP-111682 | 984 | | | Removing [] in CSFB requirement for Rel-10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 985 | | | Reference channel for RLM testing with eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 987 | | | Clarification on RSTD test cases | 10.5.0 |
| 2011-12 | RP-54 | RP-111690 | 988 | | | RSRP Measurement performance Io corrections | 10.5.0 |
| 2011-12 | RP-54 | RP-111686 | 989 | | | RLM measurement requirements for eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 990 | | | PDCCH/PCFICH transmission parameters for RLM | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 992 | | | Clarification on PRS bandwidth | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 993 | | | Missing RSRQ in intra-frequency measurement requirements for eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111686 | 994 | 1 | | Test case for TDD RSRQ Accuracy for Carrier Aggregation | 10.5.0 |
| 2011-12 | RP-54 | RP-111686 | 995 | | | Cell identification requirements without DRX | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 997 | 1 | | Test case for cell identification with eICIC in E-UTRAN FDD | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 998 | 1 | | Test case for cell identification with eICIC in E-UTRAN TDD | 10.5.0 |
| 2011-12 | RP-54 | RP-111691 | 999 | 1 | | Carrier aggregation RSRP measurement test case for TDD | 10.5.0 |
| 2011-12 | RP-54 | RP-111690 | 1001 | | | Test case for enhanced UTRA TDD cell identification for R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111690 | 1003 | | | Test case for RRC connection release redirection to UTRA TDD for R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1005 | | | Clarification of the Successful Percentage for Measurement Performance Requirements | 10.5.0 |
| 2011-12 | RP-54 | RP-111691 | 1007 | 2 | | FDD Absolute and Relative RSRQ Accuracy test in CA | 10.5.0 |
| 2011-12 | RP-54 | RP-111691 | 1011 | 1 | | FDD absolute and relative RSRP accuracies test in CA | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 1014 | 1 | | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync under time domain measurement resource restriction | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1016 | | | E-UTRAN FDD - UTRAN TDD enhanced cell identification test under AWGN propagation conditions in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1018 | 1 | | E-UTRAN FDD RRC connection release with redirection to UTRAN TDD in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1021 | 1 | | CR for Inter-RAT SI reading | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1022 | | | Addition of E-UTRAN FDD - TDD Inter frequency cell reselection test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1023 | | | Addtion of E-UTRAN TDD - FDD Inter frequency cell reselection test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1024 | | | Addtion of E-UTRAN FDD - TDD Inter frequency handover test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1025 | | | Addtion of E-UTRAN TDD - FDD Inter frequency handover test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1026 | | | Addtion of E-UTRAN TDD-FDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111687 | 1027 | 1 | | Addtion of E-UTRAN FDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in asynchronous cells test case | 10.5.0 |

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|---|---|---|---|---|---|---|---|
| 2011-12 | RP-54 | RP-111687 | 1028 | | | Addtion of E-UTRAN FDD - TDD inter frequency measurement accuracy test case | 10.5.0 |
| 2011-12 | RP-54 | RP-111681 | 1031 | | | Correction for the identification time in DRX for UTRA TDD in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1032 | | | Correction the side condition for SCH in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1033 | 1 | | Correction to event triggered reporting for TS 36.133 in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111681 | 1039 | 1 | | Correction of E-UTRAN TDD-TDD inter frequency handover test case in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1041 | | | Clarification of Expected RSTD and Expected RSTD uncertainty in RSTD test cases in R10 | 10.5.0 |
| 2011-12 | RP-54 | RP-111680 | 1043 | | | Thresholds and margins for RRM tests A.8.11.3 and A.8.11.4 | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1046 | | | Thresholds and margins for RRM tests A.8.11.5 and A.8.11.6 | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 1047 | 2 | | RLM Out of Sync Detection Test for eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1049 | | | RRC Connection Release with Redirection from E-UTRAN FDD to GERAN | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 1051 | | | Colliding CRS in non-MBSFN ABS | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1052 | | | RRC Connection Release with Redirection from E-UTRAN TDD to GERAN | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 1053 | 1 | | RLM In Sync Detection Test for FDD eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111693 | 1054 | 1 | | RLM In Sync Detection Test for FDD eICIC | 10.5.0 |
| 2011-12 | RP-54 | RP-111691 | 1055 | 1 | | FDD Event triggered reporting on deactivated Scell in non-DRX | 10.5.0 |
| 2011-12 | RP-54 | RP-111691 | 1056 | 1 | | TDD Event triggered reporting on deactivated Scell in non-DRX | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1058 | | | Adding Band XX | 10.5.0 |
| 2011-12 | RP-54 | RP-111690 | 1061 | 1 | | Optional faster higher priority reselection | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1064 | 1 | | Addition of a test case at lower RSRP level for the serving cell measurement accuracy | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1066 | | | Test cases for RRC connection release with redirection to UTRAN FDD | 10.5.0 |
| 2011-12 | RP-54 | RP-111735 | 1072 | | | CA definition alignment in test cases | 10.5.0 |
| 2011-12 | RP-54 | RP-111683 | 1074 | | | Applicable PRS BW for RSTD accuracy requirements | 10.5.0 |
| 2012-03 | RP-55 | RP-120304 | 1077 | 1 | | RSTD signalling modifications | 10.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1079 | 1 | | Test case for E-UTRA TDD RRC connection release redirection to UTRA TDD without SI provided for R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1081 | 1 | | Test case for E-UTRA FDD RRC connection release redirection to UTRA TDD without SI provided for R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120291 | 1084 | | | Thresholds and margins for E-UTRAN to C2K RRM reselection test cases (Rel-10) | 10.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1087 | | | Addition of E-UTRAN TDD-HRPD Cell Reselection: HRPD is of Lower Priority test case R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120293 | 1089 | | | Addition of E-UTRAN TDD-cdma2000 1X Cell Reselection: cdma2000 1X is of Lower Priority test case R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120293 | 1091 | | | Addition of E-UTRAN TDD-HRPD Handover test case R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1093 | | | Addition of E-UTRAN TDD-cdma2000 1X Handover test case R10 | 10.6.01 0.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1099 | | | Addition of E-UTRAN FDD-TDD inter frequency RSRQ measurement accuracy test case R10 | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1112 | 1 | | RLM test cases with SNRs for OOS and INS for E-UTRAN TDD in eICIC | 10.6.0 |
| 2012-03 | RP-55 | RP-120304 | 1115 | | | Io difference band-independent in Inter-frequency RSRP TDD TC A.9.1.4 | 10.6.0 |
| 2012-03 | RP-55 | RP-120292 | 1118 | 1 | | Thresholds and margins in RRM test case A.8.11.4 | 10.6.0 |
| 2012-03 | RP-55 | RP-120292 | 1121 | | | TDD PRACH Test cases value of PRACH Configuration Index and first preamble power | 10.6.0 |
| 2012-03 | RP-55 | RP-120292 | 1124 | 1 | | PDSCH and OCNG pattern in PRACH Test cases A.6.2.1 and A.6.2.3 | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1134 | 1 | | Clarification of colliding CRS in MBSFN ABS | 10.6.0 |
| 2012-03 | RP-55 | RP-120304 | 1135 | | | Editorial corrections on the test cases of RRC connection release with redirection to UTRAN FDD | 10.6.0 |
| 2012-03 | RP-55 | RP-120304 | 1139 | 1 | | Corrections on test case of Event triggered reporting on deactivated Scell in non-DRX<br>CR not implemented as it is based on the wrong version of the spec | 10.6.0 |
| 2012-03 | RP-55 | RP-120304 | 1140 | | | Core requirements for E-UTRAN TDD inter-RAT UTRAN FDD SI acquisition using autonomous gaps | 10.6.0 |
| 2012-03 | RP-55 | RP-120304 | 1143 | 1 | | Editorial corrections | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1145 | 1 | | Side condition clarification for eICIC with MBSFN | 10.6.0 |

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| 2012-03 | RP-55 | RP-120300 | 1146 | | | Clarification on reported cells with eICIC | 10.6.0 |
| 2012-03 | RP-55 | RP-120294 | 1148 | | | Correction of RSTD accuracy test cases for TDD | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1151 | 2 | | RLM requirements with autonomous gaps | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1152 | 1 | | SNR levels in out-of-sync RLM test cases for eICIC | 10.6.0 |
| 2012-03 | RP-55 | RP-120303 | 1156 | 1 | | CR for 36.133: B41 REFSENS and MOP changes to accommodate single filter architecture | 10.6.0 |
| 2012-03 | RP-55 | RP-120300 | 1157 | | | eICIC measurement accuracy | 10.6.0 |
| 2012-03 | RP-55 | RP-120307 | 1154 | 1 | | Introduction of Band 26/XXVI to TS 36.133 | 11.0.0 |
| 2012-06 | RP-56 | RP-120782 | 1162 | | | Resolve Band 41 omission between R4-120125 and R4-121106 | 11.1.0 |
| 2012-06 | RP-56 | RP-120770 | 1165 | 1 | | Corrections to FDD-TDD Inter-freq RSRP measurement accuracy test case parameters | 11.1.0 |
| 2012-06 | RP-56 | RP-120771 | 1168 | | | OCNG and PDSCH for FDD-TDD event triggered reporting test cases | 11.1.0 |
| 2012-06 | RP-56 | RP-120771 | 1171 | | | RRC Connection Release with Redirection from E-UTRAN FDD to GERAN without System Information | 11.1.0 |
| 2012-06 | RP-56 | RP-120771 | 1174 | | | RRC Connection Release with Redirection from E-UTRAN TDD to GERAN without System Information | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1176 | | | OCNG Patterns for MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1183 | | | Addition of E-UTRAN TDD-FDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1186 | | | Addition of E-UTRAN TDD - FDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1189 | | | Addition of E-UTRAN FDD-TDD Inter-frequency event triggered reporting when DRX is used under fading propagation conditions in asynchronous cells R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1192 | | | Addition of E-UTRAN FDD - TDD Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120777 | 1195 | 1 | | Addition of E-UTRAN TDD-HRPD event triggered reporting under fading propagation conditions test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1198 | | | Addition of E-UTRAN TDD-CDMA2000 1X event triggered reporting under fading propagation conditions test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120770 | 1201 | | | E-UTRA TDD RRC connection release redirection to UTRA FDD test without SI provided R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1205 | 1 | | FDD RSRQ under Time Domain Measurement Resource Restriction with Non-MBSFN ABS R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1207 | 1 | | TDD RSRQ under Time Domain Measurement Resource Restriction with Non-MBSFN ABS R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120780 | 1213 | | | CR to TS36.133 Corrections on RRC signalling in RLM test cases for eICIC | 11.1.0 |
| 2012-06 | RP-56 | RP-120773 | 1223 | | | Test case for event-triggered reporting on deactivated SCell with PCell interruption | 11.1.0 |
| 2012-06 | RP-56 | RP-120770 | 1227 | 1 | | Finalization of Rel.9 cell reselection enhancement related test cases | 11.1.0 |
| 2012-06 | RP-56 | RP-120770 | 1231 | | | E-UTRAN FDD to UTRAN FDD RRC connection release with redirection test case when SI is not provided | 11.1.0 |
| 2012-06 | RP-56 | RP-120781 | 1233 | | | No interruptions on PCell at SCell activation/ deactivation when measCycleSCell is smaller than 640 ms | 11.1.0 |
| 2012-06 | RP-56 | RP-120780 | 1235 | | | Editorial corrections | 11.1.0 |
| 2012-06 | RP-56 | RP-120782 | 1237 | 1 | | Reporting criteria requirements for carrier aggregation | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1239 | | | Cell identification requirements with DRX | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1241 | 1 | | Phase II eICIC FDD: absolute and relative RSRP accuracies in non-MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1243 | 1 | | Phase II eICIC TDD: absolute and relative RSRP accuracies in non-MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1249 | | | RLM requirements with autonomous gaps for DRX | 11.1.0 |
| 2012-06 | RP-56 | RP-120779 | 1251 | | | CR for 36.133: Aligning RSRQ measurement requirements in TS 36.133 with TS 36.101 regarding the modification of B41 REFSENS | 11.1.0 |
| 2012-06 | RP-56 | RP-120777 | 1260 | | | Bands 22, 23, 42 and 43 side conditions for inter-frequency measurements with autonomous gaps | 11.1.0 |
| 2012-06 | RP-56 | RP-120772 | 1261 | | | Clarification on UE Rx-Tx with eICIC | 11.1.0 |
| 2012-06 | RP-56 | RP-120767 | 1271 | | | sr-ConfigIndex in TDD DRX test cases | 11.1.0 |

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| 2012-06 | RP-56 | RP-120782 | 1273 | | | Remove [ ] from eICIC RSRP, RSRQ Es/Iot side conditions | 11.1.0 |
| 2012-06 | RP-56 | RP-120764 | 1277 | 1 | | RRM: Clarifications to the OCNG patterns | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1279 | 2 | | Intra-Frequency FDD RSRQ Accuracy under Time Domain Measurement Resource Restriction with MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1286 | 1 | | eICIC FDD out-of-sync RLM test case in MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1288 | 1 | | eICIC TDD out-of-sync RLM test case in MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120781 | 1289 | 1 | | On UE behavior in the uplink subframe after measurement GAP | 11.1.0 |
| 2012-06 | RP-56 | RP-120773 | 1293 | 1 | | Clarification on the number of monitoring layers for CA UEs | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1299 | 2 | | CR on TDD RSRQ test case under Time Domain Measurement Resource Restriction with MBSFN ABS Rel11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1303 | 1 | | In-Sync RLM test case in MBSFN ABS for E-UTRAN FDD R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1306 | 1 | | In-Sync RLM test case in MBSFN ABS for E-UTRAN TDD R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120781 | 1310 | | | Inter-frequency and Inter-RAT Requirements for Measurements without Measurement Gaps | 11.1.0 |
| 2012-06 | RP-56 | RP-120788 | 1318 | 1 | | The introduction of Multi-TA timing requirements R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120777 | 1320 | 1 | | Addition of E-UTRAN FDD RSTD measurement accuracy test case in carrier aggregation R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120777 | 1322 | | | Addition of E-UTRAN TDD RSTD measurement accuracy test case in carrier aggregation R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120779 | 1328 | | | Correction to RLM requirements in eICIC with Autonomous gaps R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120769 | 1331 | 1 | | Correction to E-UTRAN FDD/TDD - UTRAN FDD /TDD enhanced cell identification test case R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120770 | 1336 | | | Correction to E-UTRAN TDD redirection to UTRAN FDD test configuration R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120780 | 1337 | 1 | | FDD CA RSTD Measurement Reporting Delay Test Case (Rel-11) | 11.1.0 |
| 2012-06 | RP-56 | RP-120782 | 1338 | 1 | | TDD CA RSTD Measurement Reporting Delay Test Case (Rel-11) | 11.1.0 |
| 2012-06 | RP-56 | RP-120779 | 1342 | | | Correction to RSTD measurement reporting delay requirement in CA R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120795 | 1345 | 1 | | Add Band 25 Io values R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120777 | 1347 | 1 | | Clarification for cell identification condition in inter-RAT SI reading requirement R11 | 11.1.0 |
| 2012-06 | RP-56 | RP-120793 | 1349 | | | Introduction of Band 28 | 11.1.0 |
| 2012-06 | RP-56 | RP-120794 | 1350 | 1 | | Introduction of Band 44 | 11.1.0 |
| 2012-06 | RP-56 | RP-120780 | 1355 | | | Editorial corrections | 11.1.0 |
| 2012-06 | RP-56 | RP-120766 | 1361 | 2 | | Correction of a timer period in inter-frequency measurement tests | 11.1.0 |
| 2012-06 | RP-56 | RP-120764 | 1363 | 1 | | UL Transmit Timing Requirements | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1364 | 2 | | Phase IIbis eICIC FDD absolute and relative RSRP accuracy with MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1366 | 2 | | Phase IIbis eICIC TDD absolute and relative RSRP accuracy with MBSFN ABS | 11.1.0 |
| 2012-06 | RP-56 | RP-120784 | 1368 | | | OCNG correction in Phase I eICIC test cases | 11.1.0 |
| 2012-06 | RP-56 | RP-120792 | 1379 | | | Introduction of e850_LB (Band 27) to TS 36.133 | 11.1.0 |
| 2012-09 | RP-57 | RP-121301 | 1385 | | | Identification of Cell 3 in RRM Test cases A.4.2.7 and A.4.2.8 | 11.2.0 |
| 2012-09 | RP-57 | RP-121301 | 1390 | | | Making FDD-TDD Inter-freq RSRQ measurement accuracy test case band-agnostic | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1392 | | | Thresholds and margins in RRM test cases A.8.16.1 and A.8.16.2 | 11.2.0 |
| 2012-09 | RP-57 | RP-121295 | 1398 | 1 | | Modification of Handover Delay Requirement and Test Cases from E-UTRAN to cdma2000 1x (Rel-11) | 11.2.0 |
| 2012-09 | RP-57 | RP-121302 | 1400 | | | Correction to RSRP/RSRQ measurement accuracy tests in MBSFN R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1403 | | | Activation/ deactivation core requirement for carrier aggregation R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121313 | 1405 | | | Minor corrections for E-UTRAN â€“ GSM measurements without Measurement Gaps and Rx-Tx measurements when PCell is changed | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1407 | 3 | | RRM requirements for CA REFSENSE (Rel-11) | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1409 | | | Square Bracket Removal for RSTD measurement requirement in Pcell changing and Handover R11 | 11.2.0 |

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| 2012-09 | RP-57 | RP-121304 | 1411 | | | Correction to the E-UTRAN secondary component carrier measurements when common DRX is used R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1413 | | | Requirements for Inter-frequency Measurements without Gaps when DRX is used R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121304 | 1415 | | | Clarification on TDD UL-DL subframe configurations in inter-frequency RSTD measurement without gaps R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121301 | 1418 | | | Correction for E-UTRA TDD RRC connection release redirection to UTRA TDD test case R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121340 | 1419 | | | Addition of E-UTRAN FDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps | 11.2.0 |
| 2012-09 | RP-57 | RP-121340 | 1420 | | | Addition of E-UTRAN TDD - UTRAN FDD identification of a new CGI of UTRAN cell using autonomous gaps | 11.2.0 |
| 2012-09 | RP-57 | RP-121301 | 1423 | | | Correction to E-UTRAN TDD-FDD Inter-frequency event triggered reporting test case R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121302 | 1432 | | | Alignment for ABS configurations in RRM Tests R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121294 | 1433 | 1 | | Correction to RSRQ accuracy test cases R11 | 11.2.0 |
| 2012-09 | RP-57 | RP-121297 | 1438 | | | Radio conditions for PBCH reading in E-UTRA | 11.2.0 |
| 2012-09 | RP-57 | RP-121305 | 1444 | | | Introduction of inter-frequency/ RAT measurements in CA | 11.2.0 |
| 2012-09 | RP-57 | RP-121302 | 1449 | | | ABS signal transmission configuration for RRM tests | 11.2.0 |
| 2012-09 | RP-57 | RP-121340 | 1450 | 1 | | Table format update for adding new bands | 11.2.0 |
| 2012-09 | RP-57 | RP-121301 | 1454 | | | Editorial correction RRM | 11.2.0 |
| 2012-12 | RP-58 | RP-121899 | 1458 | - | | Random Access requirements for SCell | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1459 | - | | Correction on CA TDD RSTD measurement accuracy test cases R11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121849 | 1461 | - | | Correction to high priority cell measurement of UTRA TDD R11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1467 | - | | Clarification of Test Requirements for CA RSRP, RSRQ Test Cases | 11.3.0 |
| 2012-12 | RP-58 | RP-121850 | 1470 | - | | Remove [ ] from 10% requirement in RRM Test cases A.4.2.7 and A.4.2.8 | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1486 | 1 | | Clean up for CA | 11.3.0 |
| 2012-12 | RP-58 | RP-121911 | 1487 | - | | Clarification of CPICH RSCP side conditions | 11.3.0 |
| 2012-12 | RP-58 | RP-121867 | 1489 | - | | Editorial corrections | 11.3.0 |
| 2012-12 | RP-58 | RP-121867 | 1497 | - | | Band correction in RRM requirements | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1499 | - | | Correction to RSTD Measurement Reporting Delay for Carrier Aggregation Test Cases | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1506 | - | | Band-dependent RRM requirements for CA | 11.3.0 |
| 2012-12 | RP-58 | RP-121872 | 1507 | 1 | | CR on RLM Requirements for FeICIC | 11.3.0 |
| 2012-12 | RP-58 | RP-121854 | 1516 | - | | Correction of OCNG Patterns for UE Rx - Tx Time Difference Test Cases | 11.3.0 |
| 2012-12 | RP-58 | RP-121872 | 1517 | 1 | | Cell identification requirements in FeICIC | 11.3.0 |
| 2012-12 | RP-58 | RP-121851 | 1522 | - | | Time offset correction in CA test cases R11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121854 | 1529 | 1 | | Clarification on RSTD measurement requirement under HO and Pcell changing | 11.3.0 |
| 2012-12 | RP-58 | RP-121910 | 1530 | 2 | | Introduction the IDC requirements in 36.133 Rel-11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121849 | 1537 | - | | Correction on test cases for handover to UTRAN TDD for Rel-11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121910 | 1542 | - | | Updating RRM requirements in 36.133 | 11.3.0 |
| 2012-12 | RP-58 | RP-121867 | 1545 | - | | Editorial corrections RRM | 11.3.0 |
| 2012-12 | RP-58 | RP-121852 | 1549 | - | | Conditions in CSG reselection requirements | 11.3.0 |
| 2012-12 | RP-58 | RP-121852 | 1553 | - | | Correcting inconsistency between inter-RAT UTRA measurements and requirements | 11.3.0 |
| 2012-12 | RP-58 | RP-121861 | 1555 | - | | Refsens requirements for CA capable UE | 11.3.0 |
| 2012-12 | RP-58 | RP-121854 | 1558 | 1 | | Intra-frequency RSTD accuracy requirements account for serving cell bandwidth | 11.3.0 |
| 2012-12 | RP-58 | RP-121854 | 1559 | 1 | | Clarification on the total number of cells for RSTD inter-frequency measurement | 11.3.0 |
| 2012-12 | RP-58 | RP-121860 | 1561 | 1 | | Clarification of the TDM pattern conditions | 11.3.0 |
| 2012-12 | RP-58 | RP-121873 | 1562 | 1 | | MDT requirements in Rel-11 | 11.3.0 |
| 2012-12 | RP-58 | RP-121901 | 1563 | - | | Introduction of Band 29 | 11.3.0 |
| 2012-12 | | | | | | Editorial Correction | 11.3.1 |
| 2013-03 | RP-59 | RP-130268 | 1477 | 1 | | Correction to Inter-frequency Measurements in CA mode test case R11 | 11.4.0 |
| 2013-03 | RP-59 | RP-130287 | 1480 | 1 | | Requirements for RSRP and RSRQ for E-CID Positioning | 11.4.0 |
| 2013-03 | RP-59 | RP-130263 | 1566 | | | Secondary Component carrier levels for CA RSRP Test cases A.9.1.6 and A.9.1.7 | 11.4.0 |

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| 2013-03 | RP-59 | RP-130263 | 1568 | | | Remove intra-frequency relative Requirement for CA RSRQ Test Cases | 11.4.0 |
| 2013-03 | RP-59 | RP-130263 | 1572 | | | Cell timing for CA RSRP and RSRQ Test cases | 11.4.0 |
| 2013-03 | RP-59 | RP-130277 | 1573 | 1 | | Editorial correction for introduction of Band 29 | 11.4.0 |
| 2013-03 | RP-59 | RP-130263 | 1576 | | | Clarification of retuning interruption in single carrier operation | 11.4.0 |
| 2013-03 | RP-59 | RP-130260 | 1579 | | | RRM: RMC and OCNG pattern for FDD CGI test with autonomous gaps (Rel-11) | 11.4.0 |
| 2013-03 | RP-59 | RP-130268 | 1582 | | | Correction to CSG proximity requirement | 11.4.0 |
| 2013-03 | RP-59 | RP-130268 | 1584 | | | E-UTRAN FDD Proximity Indication RRM Requirements (Rel-11) | 11.4.0 |
| 2013-03 | RP-59 | RP-130275 | 1589 | 1 | | Clarification of Cell Identification core requirement in FeICIC | 11.4.0 |
| 2013-03 | RP-59 | RP-130283 | 1591 | 1 | | RSRP/RSRQ measurement accuracy requirements in FeICIC | 11.4.0 |
| 2013-03 | RP-59 | RP-130263 | 1598 | | | UE interruption requirements in SCC RSTD measurements with de-activated Scell R11 | 11.4.0 |
| 2013-03 | RP-59 | RP-130287 | 1602 | | | Timing offset correction in CA RSTD test cases | 11.4.0 |
| 2013-03 | RP-59 | RP-130280 | 1616 | | | Editorial corrections for IDC | 11.4.0 |
| 2013-03 | RP-59 | RP-130262 | 1618 | | | Editorial corrections for eICIC | 11.4.0 |
| 2013-03 | RP-59 | RP-130258 | 1622 | | | Editorial corrections RRM | 11.4.0 |
| 2013-03 | RP-59 | RP-130259 | 1627 | | | A clarification on measurement gap pattern in RSTD requirements | 11.4.0 |
| 2013-03 | RP-59 | RP-130268 | 1642 | 1 | | Modification of PRS configuration for RSTD measurement reporting delay test cases(Rel-11) | 11.4.0 |
| 2013-03 | RP-59 | RP-130261 | 1644 | | | E-UTRAN FDD Proximity Indication Test Case (Rel-11) | 11.4.0 |
| 2013-06 | RP-60 | RP-130763 | 1648 | | | Correction to test parameters for combined E-UTRA - E-UTRA and GSM cell search - Rel 11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1649 | | | Remove the Brackets in cell identification of FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1657 | | | Clarification on inter-frequency RSTD measurement accuracy requirement R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1659 | 1 | | RRM test configurations for 20MHz R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1668 | 1 | | Corrections on RSTD measurement test cases (Rel-11) | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1673 | | | Remove [ ] from GCI identification Test cases A.8.4.4 and A.8.4.5 | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1677 | | | Cell 1 levels for RSRP Test cases A.9.1.3 and A.9.1.4 | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1679 | 1 | | RSRP, RSRQ RRM eICIC Test case cleanup | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1683 | | | Update on the GSM carrier RSSI measurement period when DRX is used | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1692 | | | sr-ConfigIndex in TDD-FDD Inter-frequency event triggered DRX Test case A.8.14.2 | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1694 | | | Testing of CA tests with multiple BW combinations | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1696 | | | Reference measurement channels for 20 MHz Tests | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1702 | | | Editorial corrections RRM | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1706 | | | Section numbering correction | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1708 | 1 | | Editorial corrections for FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1709 | 1 | | Removing an eICIC note on measurements | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1713 | | | Clean up for CA | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1716 | | | Editorial corrections in RSTD requirements | 11.5.0 |
| 2013-06 | RP-60 | RP-130766 | 1719 | | | SCell Activation Delay Requirements in CA | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1721 | | | Clarification on supported bandwidth combinations in RSTD requirements with CA | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1723 | 1 | | Impact of REFSENS requirements on the core specification | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1724 | | | Correction of the total number of reporting criteria | 11.5.0 |
| 2013-06 | RP-60 | RP-130769 | 1728 | 1 | | Condition clarification in MDT requirements | 11.5.0 |
| 2013-06 | RP-60 | RP-130769 | 1732 | | | Band 26 test cases corrections | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1739 | | | CR on Interruptions for Intra-band Non-contiguous Carrier Aggregation | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1744 | | | Time Alignment Timer in Test Case A.8.2.4 | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1745 | | | RRM: Adding required measurement gap | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1749 | | | TDD PRACH configuration index for Test Cases A.8.7.2, A.8.15.2 | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1752 | | | GSM cell list size for Test Cases A.6.3.10, A.6.3.11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1755 | | | Neighbour list for Test cases A.8.5.4, A.8.7.4, A.8.9.2 | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1758 | | | Additional corrections on intra-frequency RSTD test parameters (Rel-11) | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1760 | | | Additional corrections on inter-frequency RSTD test parameters (Rel-11) | 11.5.0 |

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| 2013-06 | RP-60 | RP-130767 | 1762 | | | Phase I CA 20 MHz Tests: Event triggered reporting on deactivating Scells in non-DRX | 11.5.0 |
| 2013-06 | RP-60 | RP-130763 | 1767 | | | Corrections of E-UTRAN FDD CSG Proximity Indication Test Case (Rel-11) | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1770 | 1 | | In sync detection with CRS assistance information with non-MBSFN ABS in FDD | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1771 | 1 | | In sync detection with CRS assistance information with non-MBSFN ABS in TDD | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1772 | 1 | | E-UTRAN FDD RLM Out-of-sync Test of FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1773 | 1 | | E-UTRAN TDD RLM Out-of-sync Test of FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1776 | | | E-UTRAN FDD absolute and relative RSRP accuracies for 20MHz in CA R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1778 | | | E-UTRAN TDD absolute and relative RSRP accuracies for 20MHz in CA R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1780 | | | Modification of OCNG patterns of RRM test configuration for 20MHz R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1782 | | | Clarification of Pcell in 36.133 R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1784 | | | FDD Absolute and relative RSRQ accuracies for CA with 20MHz BW (Rel-11) | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1786 | | | TDD Absolute and relative RSRQ accuracies for CA with 20MHz BW (Rel-11) | 11.5.0 |
| 2013-06 | RP-60 | RP-130761 | 1790 | | | Correction on fading propagation condition for CA inter-RAT test cases R11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1791 | | | Clean up for band 44 | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1793 | 1 | | E-UTRAN TDD UE Rx-Tx time difference test case in eICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1799 | 1 | | Test case for UE Transmit Timing Accuracy for SCell | 11.5.0 |
| 2013-06 | RP-60 | RP-130767 | 1801 | | | CR on measurements without gaps | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1804 | 1 | | Editorial corrections RRM | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1806 | 1 | | Clarification for UE Rx-Tx with eICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1807 | 2 | | Capturing RF requirements in the core specification | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1808 | 1 | | Test case for UE Rx-Tx accuracy with eICIC in FDD | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1812 | 1 | | RSRP and RSRQ relative accuracy requirements for FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130765 | 1814 | 1 | | Adding clarification for begin and end of measurement GAP for Rel-11 | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1821 | | | Measurement requirements with interruptions due to CA | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1822 | | | Clarification on antenna ports in the measured and aggressor cells with FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1825 | 1 | | UE Rx-Tx accuracy requirements with FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1826 | | | UE Rx-Tx measurement requirements with FeICIC | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1827 | 2 | | Test case for cell identification with FeICIC in FDD | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1828 | 2 | | Test case for cell identification with FeICIC in TDD | 11.5.0 |
| 2013-06 | RP-60 | RP-130770 | 1829 | 1 | | Corrections on Wideband RSRQ inter-frequency accuracy requirements | 11.5.0 |
| 2013-06 | RP-60 | RP-130791 | 1769 | 1 | | Introduction of Band 30 | 12.0.0 |
| 09-2013 | RP-61 | RP-131303 | 1830 | 1 | | UTRAN FDD CPICH Ec/No measurement accuracy test for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131291 | 1832 | | | Correction on the test cases for UE Transmit Timing Accuracy for SCell (Rel-12) | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1836 | | | Corrections on RSTD CA test parameters (Rel-12) | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1839 | | | FDD: RSTD measurement reporting test cases for CA with 20MHz BW (Rel-12) | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1842 | | | TDD: RSTD measurement reporting test cases for CA with 20MHz BW (Rel-12) | 12.1.0 |
| 09-2013 | RP-61 | RP-131285 | 1844 | | | Timing and RSRP value corrections in Test cases A.9.2.6 and A.9.2.9 | 12.1.0 |
| 09-2013 | RP-61 | RP-131285 | 1846 | | | Corrections to Bands for 20MHz CA Test cases | 12.1.0 |
| 09-2013 | RP-61 | RP-131279 | 1854 | | | Cell time offset in TDD Inter-RAT test cases | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1855 | | | EUTRA FDD-UTRA FDD cell reselection: UTRA FDD is of lower priority | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1860 | | | Rel-12 CRs on synchronization requirements for E-UTRA to CDMA 2000 handover | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1866 | 1 | | Correct the SNR values for RLM tests with non-MBSFN ABS in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1869 | 1 | | E-UTRAN FDD RSRP Measurement Accuracy Test in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1871 | 1 | | E-UTRAN TDD RSRP Measurement Accuracy Test in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1873 | | | E-UTRAN FDD UE Rx-Tx Time difference test in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1875 | | | E-UTRAN TDD UE Rx-Tx Time difference test in FeICIC R12 | 12.1.0 |

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| 09-2013 | RP-61 | RP-131284 | 1881 | | | Clarification on UE Rx-Tx accuracy requirements in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1883 | | | Clarification on UE Rx-Tx measurement requirements in FeICIC R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1886 | | | Clarification on antenna port for timing and eCID test cases R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1889 | 1 | | Addition of TDD serving cell measurement accuracy tests R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1890 | | | Introduction of Band 31 in 36.133 | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1891 | | | Addition of New OCNG Pattern for 5MHz | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1892 | | | E-UTRAN FDD intra-frequency RSRP measurement accuracy for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1893 | | | E-UTRAN FDD-FDD inter-frequency RSRP measurement accuracy for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1894 | | | E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync for 5MHz Bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1895 | | | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1896 | | | E-UTRAN FDD-FDD intra-frequency Cell Re-selection case for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1897 | | | E-UTRAN FDD intra-frequency RRC re-establishment for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1898 | | | E-UTRAN FDD - Contention Based Random Access Test for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1899 | 1 | | E-UTRAN FDD - UE Transmit Timing Accuracy Tests for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1900 | | | E-UTRA FDD- UTRA FDD inter-RAT handover case for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1901 | 1 | | E-UTRA FDD- UTRA FDD CPICH RSCP measurement accuracy issues | 12.1.0 |
| 09-2013 | RP-61 | RP-131285 | 1903 | | | Clarification of Refesens in WB-RSRQ sections of 36.133 R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1905 | | | Remove the brackets of FeICIC side conditions R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1908 | 1 | | Test cases of E-UTRAN FDD RSTD Measurement Accuracy for Carrier Aggregation for 20MHz R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1913 | 1 | | Test cases of E-UTRAN TDD RSTD Measurement Accuracy for Carrier Aggregation for 20MHz R12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1916 | | | Correction to SCH Es/Iot side condition for intra-frequency measurements under time domain measurement resource restriction with CRS assistance information | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1919 | | | E-UTRAN FDD " Non-contention Based Random Access Test for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1921 | | | Modification on the requirement for PCell interruption for Rel-12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1922 | | | E-UTRAN FDD " Timing Advance Accuracy Test for 5MHz bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1928 | | | Phase II CA 20 MHz Tests: Event triggered reporting on deactivating SCell and and interruption probability without DRX | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1945 | 1 | | CR on Applicability of 5MHz Test Cases | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1946 | 1 | | E-UTRAN FDD Radio Link Monitoring Test for In-Sync for 5MHz | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1947 | | | E-UTRAN FDD Intra-frequency handover test for 5MHz Channel Bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1948 | | | E-UTRAN FDD Intra-frequency RSRQ Accuracy Test for 5MHz Channel Bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131293 | 1952 | | | Editorial corrections RRM | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1954 | | | E-UTRAN FDD Inter-frequency RSRQ Accuracy Test for 5MHz Channel Bandwidth | 12.1.0 |
| 09-2013 | RP-61 | RP-131293 | 1955 | | | Clarification of CGI reading requirements | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1958 | 2 | | E-UTRAN FDD Radio Link Monitoring Test for In-Sync for 5MHz with DRX | 12.1.0 |
| 09-2013 | RP-61 | RP-131285 | 1961 | | | Editorial corrections in capturing RF requirements | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1964 | | | Clarification on tests for multiple bandwidths | 12.1.0 |
| 09-2013 | RP-61 | RP-131282 | 1969 | | | CR on PCell interrutptions | 12.1.0 |
| 09-2013 | RP-61 | RP-131283 | 1970 | | | Time stamp accuracy for RLF and handover failure reporting with eMDT | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1971 | | | FDD reference measurement channels for 5 MHz tests | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1972 | | | Part II RRM tests: UE intra-frequency measurements with synchronous cells in DRX FDD | 12.1.0 |

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| 09-2013 | RP-61 | RP-131303 | 1973 | | | Part II RRM tests: E-UTRAN FDD - UTRAN FDD event triggered reporting under fading propagation conditions | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1978 | | | Correction of cell identification test case with FeICIC | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1984 | | | RLM requirements correction | 12.1.0 |
| 09-2013 | RP-61 | RP-131284 | 1988 | | | Clarification on antenna ports in the measured and aggressor cells for UE Rx-Tx with FeICIC | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1990 | | | FeICIC FDD Test for In-sync With MBSFN ABS for Rel. 12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131290 | 1992 | | | FeICIC TDD Test for In-sync With MBSFN ABS for Rel. 12 | 12.1.0 |
| 09-2013 | RP-61 | RP-131303 | 1993 | | | Correction of the SNR value of Out of sync RLM test for 5MHz | 12.1.0 |
| 12-2013 | RP-62 | RP-131927 | 1996 | | | Corrections to CA event triggered tests on deactivated SCell with PCell interruption in non-DRX (Rel-12) | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2003 | | | Corrections to CA Interruption Requirements | 12.2.0 |
| 12-2013 | RP-62 | RP-131926 | 2009 | | | CRS Es/Iot for eICIC RSRP, RSRQ with MBSFN ABS Test Cases | 12.2.0 |
| 12-2013 | RP-62 | RP-131941 | 2010 | | | Correction to RSTD measurement accuracy side condition for Band 31 | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2013 | | | Amendment on SCell Activation Delay Requirements for other activation actions | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2016 | | | Amendment on SCell Activation Delay Requirements in case no RS for measurement | 12.2.0 |
| 12-2013 | RP-62 | RP-131936 | 2019 | | | Correction to the SNR values for RLM tests with MBSFN ABS in FeICIC R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131936 | 2023 | | | Correction for the RSRP/RSRQ test cases in FeICIC R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2031 | 1 | | CR on PCell Interruptions For Inter-band CA During Measurements | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2039 | | | Introduction of E-UTRAN TDD WB-RSRQ test case R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131925 | 2044 | | | Correction of Proximity Indication Test Case<br>Not implemented as it is not based on the latest version of the spec | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2053 | | | Clarifications for intra-band non-contiguous CA R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2058 | | | Inter-frequency WB-RSRQ FDD test case | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2071 | | | Clarification on Pcell Interruption shall not occur before SF n+5 | 12.2.0 |
| 12-2013 | RP-62 | RP-131925 | 2078 | | | Correction in RSTD requirements | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2080 | | | Editorial corrections RRM | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2084 | 1 | | Band simplification | 12.2.0 |
| 12-2013 | RP-62 | RP-131931 | 2091 | | | Requirements clarification under different BWs in FeICIC | 12.2.0 |
| 12-2013 | RP-62 | RP-131931 | 2095 | | | Correction in cell search FeICIC test cases | 12.2.0 |
| 12-2013 | RP-62 | RP-131936 | 2097 | 1 | | Correct ABS pattern for FeICIC for In-sync with MBSFN ABS for Rel. 12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131926 | 2104 | | | Correction to Test cases A.9.2.9 and A.9.2.10 | 12.2.0 |
| 12-2013 | RP-62 | RP-131942 | 2106 | 1 | | Bands applicability in RSRP, RSRQ FDD-FDD Inter frequency tests for 5MHz Bandwidth | 12.2.0 |
| 12-2013 | RP-62 | RP-131925 | 2111 | | | Corrections to CGI Reading in Autonomous Gap | 12.2.0 |
| 12-2013 | RP-62 | RP-131936 | 2123 | | | Remove the brackets of SNR values in RLM test cases in FeICIC R12 | 12.2.0 |
| 12-2013 | RP-62 | RP-131967 | 2129 | | | Correction on RMC pattern for 5MHz UE Transmit Timing Accuracy Tests | 12.2.0 |
| 12-2013 | RP-62 | RP-131928 | 2135 | | | CSI Reporting in SCell Activation Requirements | 12.2.0 |
| 12-2013 | RP-62 | RP-131927 | 2143 | | | Editorial corrections RRM | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2145 | | | Applying band simplification | 12.2.0 |
| 12-2013 | RP-62 | RP-131939 | 2151 | | | Correction to MTA requirements | 12.2.0 |
| 12-2013 | RP-62 | RP-131925 | 2155 | | | Correction in RSTD test cases | 12.2.0 |
| 12-2013 | RP-62 | RP-131931 | 2157 | | | Correction to interference clarification in FeICIC requirements | 12.2.0 |
| 03-2014 | RP-63 | RP-140389 | 2236 | | | Band simplification clean up | 12.3.0 |
| 03-2014 | RP-63 | RP-140368 | 2234 | | | Missing condition in CGI identification requirements | 12.3.0 |
| 03-2014 | RP-63 | RP-140368 | 2224 | | | CSI Reporting in SCell Activation Requirements | 12.3.0 |
| 03-2014 | RP-63 | RP-140368 | 2258 | | | Alignment between interruption requirements for RSTD and mobillity measurements for SCell | 12.3.0 |
| 03-2014 | RP-63 | RP-140367 | 2263 | | | Correction of Proximity Indication Test Case | 12.3.0 |
| 03-2014 | RP-63 | RP-140380 | 2259 | | | Addition of new OCNG pattern for E-UTRA TDD with 5MHz bandwidth | 12.3.0 |
| 03-2014 | RP-63 | RP-140380 | 2260 | | | Addition of new RMC for E-UTRA TDD with 5MHz bandwidth | 12.3.0 |

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| 03-2014 | RP-63 | RP-140380 | 2261 | | | Addition of OCNG pattern for E-UTRA FDD with 5MHz bandwidth without MBSFN | 12.3.0 |
| 03-2014 | RP-63 | RP-140381 | 2169 | | | Updates on test case A.9.1.17 FDD—FDD Inter frequency case for 5MHz Bandwidth for R12 | 12.3.0 |
| 03-2014 | RP-63 | RP-140389 | 2170 | | | Correction on the SNR values of in-sync RLM test for 5MHz | 12.3.0 |
| 03-2014 | RP-63 | RP-140371 | 2200 | 1 | | Clarification of BW applicability in Rx-Tx Time Difference measurement R12 | 12.3.0 |
| 03-2014 | RP-63 | RP-140389 | 2182 | | | Clarification on FDD reference measurement channels for 5 MHz tests | 12.3.0 |
| 03-2014 | RP-63 | RP-140368 | 2181 | | | Correction on PDSCH allocation in PRS subframe r12 | 12.3.0 |
| 03-2014 | RP-63 | RP-140367 | 2192 | | | PRS_RA corrections | 12.3.0 |
| 06-2014 | RP-64 | RP-140650 | 2331 | 3 | | Introduction of test cases for 5MHz +5MHz : absolute and relative RSRQ accuracies in CA for FDD and TDD<br>The CR was not implemented as it contained the wrong content. | 12.4.0 |
| 06-2014 | RP-64 | RP-140743 | 2366 | 1 | | SCell activation and deactivation delay test case for known SCell | 12.4.0 |
| 06-2014 | RP-64 | RP-140910 | 2312 | | | Clarification on UE Transmit Timing Accuracy test cases in DRX mode R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140910 | 2267 | | | RRM: Clean-up of time offset between cells in RSTD tests (Rel-12) | 12.4.0 |
| 06-2014 | RP-64 | RP-140910 | 2354 | | | RSTD inter-frequency requirements applicability | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2382 | | | RRM: Remove square brackets from eICIC RLM test requirement (Rel-12) | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2379 | | | Correction to periodicity of ABS pattern in eICIC RRM test cases | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2315 | | | Correction for OCNG pattern number in RRM tests R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2302 | | | Introduce the CGI reading requirements in CA R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2360 | 1 | | Test case corrections for eICIC | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2278 | | | Removing DPCH for handover from E-UTRAN to UTRA TDD for Rel-12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2422 | | | Clean up the correction on PDSCH allocation in PRS subframe R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140911 | 2319 | | | Clarification on E-UTRAN TDD - UE Timing Advance Adjustment Accuracy Test R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140914 | 2416 | | | Correction to PCI configuration conditions in FeICIC tests R12 | 12.4.0 |
| 06-2014 | RP-64 | RP-140914 | 2338 | | | CQI feedback periodicity correction for RLM in eICIC/FeICIC test setup | 12.4.0 |
| 06-2014 | RP-64 | RP-140916 | 2307 | | | E-UTRAN TDD - UE Timing Advance Adjustment Accuracy Test for Scell in sTAG | 12.4.0 |
| 06-2014 | RP-64 | RP-140916 | 2340 | 1 | | Test case for RACH on SCell | 12.4.0 |
| 06-2014 | RP-64 | RP-140916 | 2306 | | | E-UTRAN FDD - UE Timing Advance Adjustment Accuracy Test for Scell in sTAG | 12.4.0 |
| 06-2014 | RP-64 | RP-140918 | 2357 | | | Editorial corrections RRM | 12.4.0 |
| 06-2014 | RP-64 | RP-140918 | 2364 | | | Clean up for Band 29 | 12.4.0 |
| 06-2014 | RP-64 | RP-140918 | 2445 | | | Removing square brackets in FeICIC test cases | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2387 | | | E-UTRAN FDD RSTD measurement reporting in carrier aggregation for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2388 | | | E-UTRAN TDD RSTD measurement reporting in carrier aggregation for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2389 | | | E-UTRAN FDD RSTD measurement accuracy in CA for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2390 | | | E-UTRAN TDD RSTD measurement accuracy in CA for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2290 | | | E-UTRAN FDD absolute and relative RSRP accuracies in CA for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140923 | 2291 | | | E-UTRAN TDD absolute and relative RSRP accuracies in CA for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140926 | 2339 | | | Introduction of Band 32/XXXII | 12.4.0 |
| 06-2014 | RP-64 | RP-140928 | 2394 | 1 | | Introduce RRM measurement requirements for eIMTA | 12.4.0 |
| 06-2014 | RP-64 | RP-140928 | 2396 | 1 | | Inter frequency measurements using autonomous gaps | 12.4.0 |
| 06-2014 | RP-64 | RP-140930 | 2374 | 1 | | RRM requirements for TDD-FDD CA | 12.4.0 |
| 06-2014 | RP-64 | RP-140937 | 2412 | 1 | | Introduction of test cases for 5MHz +5MHz : RSTD Measurement Accuracy in Carrier Aggregation for 5 + 5MHz bandwidth | 12.4.0 |

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| 06-2014 | RP-64 | RP-140937 | 2330 | 1 | | Introduction of test cases for 5MHz +5MHz : absolute and relative RSRP accuracies in CA for FDD and TDD | 12.4.0 |
| 06-2014 | RP-64 | RP-140937 | 2410 | 1 | | Introduction of test cases for 5MHz +5MHz : RSTD Measurement Reporting Test Case | 12.4.0 |
| 06-2014 | RP-64 | RP-140937 | 2332 | 2 | | Introduction of test cases for 5MHz +5MHz : Event triggered reporting on deactivating Scells in non-DRX FDD and TDD | 12.4.0 |
| 06-2014 | RP-64 | RP-140937 | 2415 | 1 | | Introduction of test cases for 5MHz +5MHz : E-UTRA event triggered reporting on deactivated SCell with PCell interruption in non-DRX | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2294 | | | E-UTRAN TDD absolute and relative RSRQ accuracies in CA for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2385 | | | E-UTRAN FDD Event triggered reporting on deactivating Scells and interruption probability (0.5%) without DRX for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2386 | | | E-UTRAN TDD Event triggered reporting on deactivating Scells and interruption probability (0.5%) without DRX for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2292 | | | E-UTRAN FDD absolute and relative RSRQ accuracies in CA for 5MHz+10MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2289 | | | E-UTRAN TDD Event triggered reporting under deactivated Scell in non-DRX for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140939 | 2288 | | | E-UTRAN FDD Event triggered reporting under deactivated Scell in non-DRX for 10MHz+5MHz | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2384 | | | Correct Correlation Matrix and Antenna Configuration for RRM test cases A.8 | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2346 | 1 | | E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2383 | | | Correct Correlation Matrix and Antenna Configuration for RRM test cases A.4, A.7 | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2336 | 2 | | New Test Case for UE Transmit Timing Accuracy requirements in DRX | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2268 | 1 | | UE Behaviour after Measurement Gap | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2345 | 1 | | E-UTRAN FDD - UE Transmit Timing Accuracy Tests for SCell in sTAG | 12.4.0 |
| 06-2014 | RP-64 | RP-140945 | 2419 | | | Editorial correction for band 31 in 36.133 | 12.4.0 |
| 06-2014 | RP-64 | RP-140959 | 2395 | 2 | | Introduce RSRP/RSRQ measurement accuracy requirements for 3DL CA | 12.4.0 |
| 06-2014 | RP-64 | RP-140959 | 2376 | 3 | | Introduce the support of 3DL CA to TS 36.133 Section 7.8 "Interruptions with Carrier Aggregation" | 12.4.0 |
| 06-2014 | RP-64 | RP-140959 | 2375 | 2 | | Introduce the support of 3DL CA to TS 36.133 Section 7.1 "UE transmit timing" | 12.4.0 |
| 06-2014 | RP-64 | RP-140959 | 2373 | 2 | | SCell activation and deactivation delay requirements for 3 DL CA | 12.4.0 |
| 09-2014 | RP-65 | RP-141526 | 2527 | | | Tolerance levels for measurements on UTRAN | 12.5.0 |
| 09-2014 | RP-65 | RP-141530 | 2474 | | | Correction to periodicity of ABS pattern in feICIC RRM test cases | 12.5.0 |
| 09-2014 | RP-65 | RP-141531 | 2515 | 1 | | Maximum transmission timing difference | 12.5.0 |
| 09-2014 | RP-65 | RP-141536 | 2502 | | | Introduction of test cases for 5MHz +5MHz : absolute and relative RSRQ accuracies in CA for FDD and TDD | 12.5.0 |
| 09-2014 | RP-65 | RP-141539 | 2481 | | | Modification on E-UTRAN event triggered reporting under deactivated SCell for 20 MHz bandwidth | 12.5.0 |
| 09-2014 | RP-65 | RP-141545 | 2523 | 2 | | Introduction of BeaconRSSI measurements for WLAN/3GPP Radio Interworking | 12.5.0 |
| 09-2014 | RP-65 | RP-141554 | 2492 | | | Interruptions on Activated Serving Cells for 3DL CA | 12.5.0 |
| 09-2014 | RP-65 | RP-141554 | 2495 | | | Requirements for UE Measurements Procedures in RRC_CONNECTED State for 3DL CA | 12.5.0 |
| 09-2014 | RP-65 | RP-141562 | 2454 | 1 | | Correction of values in RSTD tests | 12.5.0 |
| 09-2014 | RP-65 | RP-141562 | 2457 | | | Clarification to RSTD CA Reporting Delay tests | 12.5.0 |
| 09-2014 | RP-65 | RP-141562 | 2480 | 1 | | Clarification on UE bahavior considering max transmit timing difference between TAGs R12 | 12.5.0 |
| 09-2014 | RP-65 | RP-141562 | 2496 | 1 | | Applicability of requirements | 12.5.0 |
| 09-2014 | RP-65 | RP-141562 | 2510 | | | Note to clarify that certain requirements do not apply to band 32 | 12.5.0 |
| 09-2014 | RP-65 | RP-141700 | 2471 | 3 | | Clarification for ACK/NACK feedback of CGI measurement | 12.5.0 |
| 12-2014 | RP-66 | RP-142176 | 2484 | 2 | | Introducing measurement accuracy requirements for UE category 0 in TS36.133 Clause 9 | 12.6.0 |
| 12-2014 | RP-66 | RP-142176 | 2506 | 3 | | Measurements requirements for UE category 0 with 1 Rx | 12.6.0 |
| 12-2014 | RP-66 | RP-142143 | 2534 | - | | Correction of PRS Signal Levels in RSTD Reporting Tests | 12.6.0 |

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| 12-2014 | RP-66 | RP-142144 | 2538 | - | | Correction of Es/Noc values in inter-frequency RSTD tests | 12.6.0 |
| 12-2014 | RP-66 | RP-142174 | 2547 | 1 | | Introduction of PDSCH FRC for TDD UL-DL configuration 0 | 12.6.0 |
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| 12-2014 | RP-66 | RP-142174 | 2555 | 1 | | CR on inter frequency RSRP test case for eIMTA | 12.6.0 |
| 12-2014 | RP-66 | RP-142174 | 2556 | 1 | | CR on inter frequency RSRQ test case for eIMTA | 12.6.0 |
| 12-2014 | RP-66 | RP-142147 | 2566 | - | | Correction to ABS pattern and CRS Es/Iot in feICIC RRM test cases | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2569 | - | | SCell activation and deactivation delay test case for unknown SCell R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142157 | 2573 | 2 | | Clarification on cell identification for TDD config 0 | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2585 | 1 | | RSRQ accuracy test case in TDD-FDD CA when Pcell is FDD R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2586 | 1 | | RSRQ accuracy test case in TDD-FDD CA when Pcell is TDD R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142147 | 2597 | - | | Correction on Io value in CA 20MHz RSRQ test case R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142163 | 2598 | - | | Correction on Io value in CA 10MHz+5MHz RSRQ test case R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2599 | - | | Range increase for RSRQ | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2606 | 1 | | Clarification of parallel reporting criteria (E-UTRA) | 12.6.0 |
| 12-2014 | RP-66 | RP-142164 | 2611 | 1 | | Interruptions with RSTD Measurements for 3DL CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142164 | 2614 | - | | RRM requirements for RSTD in 3 DL CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2619 | 1 | | RSRP accuracy test cases for TDD-FDD CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142176 | 2630 | - | | SI reading requirements for UE category 0 with 1 Rx in FDD, TDD and HD-FDD | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2639 | - | | Changes to RSTD CA Reporting Delay tests | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2640 | - | | Revision of RSRP absolute accuracy requirements in Rel-12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2644 | - | | Clarifications to RSTD values | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2656 | - | | Correction to RSTD Intra Frequency Delay Test Case | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2665 | - | | Correction on autonomous time adjustment in MTAG case | 12.6.0 |
| 12-2014 | RP-66 | RP-142176 | 2666 | - | | Introduce RLM requirements for LC-MTC in TS36.133 | 12.6.0 |
| 12-2014 | RP-66 | RP-142174 | 2669 | 1 | | Introducing test case for TDD-TDD Inter-frequency event triggered reporting for TDD UL/DL configuration 0 | 12.6.0 |
| 12-2014 | RP-66 | RP-142179 | 2670 | 1 | | Introducing requirements for small cell enhancement in TS36.133 | 12.6.0 |
| 12-2014 | RP-66 | RP-142180 | 2671 | 2 | | Introducing interruption requirements for dual connectivity into TS36.133 | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2674 | - | | E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2675 | - | | E-UTRAN TDD event triggered reporting on deactivating SCell with PCell interruption in non-DRX for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2676 | - | | E-UTRAN TDD RSTD Measurement Reporting Test Case for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2677 | - | | TDD RSRP for E-UTRAN Carrier Aggregation for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2678 | 1 | | TDD RSRP for E-UTRAN Carrier Aggregation for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142162 | 2679 | - | | E-UTRAN TDD RSTD Measurement Accuracy in Carrier Aggregation for 20MHz+10MHz | 12.6.0 |
| 12-2014 | RP-66 | RP-142143 | 2682 | 1 | | Introducing positioning enhancement requirement for UE Rx-Tx accuracy | 12.6.0 |
| 12-2014 | RP-66 | RP-142144 | 2686 | - | | Correction on CA test cases in R12 | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2687 | - | | Correction on E-UTRAN TDD – Non-Contention Based Random Access Test For Scell | 12.6.0 |
| 12-2014 | RP-66 | RP-142179 | 2688 | 1 | | Introduction of RSRP measurement accuracy requirement for DRS based measurement | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2690 | 1 | | Ecat clarification for iRAT | 12.6.0 |
| 12-2014 | RP-66 | RP-142180 | 2694 | - | | CR for TS36.133 on Cell phase accuracy for Dual Connectivity | 12.6.0 |
| 12-2014 | RP-66 | RP-142180 | 2695 | 1 | | Introduction of RRM requirements for Dual Connectivity | 12.6.0 |
| 12-2014 | RP-66 | RP-142180 | 2696 | 1 | | Introduction of measurement requirements for Dual Connectivity | 12.6.0 |
| 12-2014 | RP-66 | RP-142178 | 2697 | 1 | | Measurement and reporting of BLER in section 9 | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2698 | 1 | | Introduction of TDD-FDD CA test cases | 12.6.0 |
| 12-2014 | RP-66 | RP-142178 | 2699 | 1 | | CR on measurement for MBSFN MDT | 12.6.0 |

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| 12-2014 | RP-66 | RP-142188 | 2707 | 1 | | PCell Interruption in Rel-12 CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142158 | 2708 | 1 | | UE Behaviour after Measurement Gap in CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2709 | 1 | | CA RRM Testing for Multiple Duplex Modes | 12.6.0 |
| 12-2014 | RP-66 | RP-142177 | 2710 | 1 | | CA RRM Testing for Fall back CA Configuration | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2712 | 1 | | Introduction of High Doppler measurement accuracy requierments | 12.6.0 |
| 12-2014 | RP-66 | RP-142172 | 2714 | 1 | | Requirements for increased carrier monitoring for idle mode 36.133 | 12.6.0 |
| 12-2014 | RP-66 | RP-142172 | 2715 | 1 | | Requirements for increased carrier monitoring in RRC connected state 36.133 | 12.6.0 |
| 12-2014 | RP-66 | RP-142161 | 2716 | 1 | | Different TDD configurations in CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142178 | 2722 | 1 | | MBMS requirements in section 9 | 12.6.0 |
| 12-2014 | RP-66 | RP-142179 | 2725 | 1 | | Intra-frequency and inter-frequency measurement accuracy requirements with DMTC | 12.6.0 |
| 12-2014 | RP-66 | RP-142188 | 2727 | - | | RSTD accuracy requirements for smaller and larger bandwidths | 12.6.0 |
| 12-2014 | RP-66 | RP-142149 | 2736 | - | | Corrections to E-UTRAN TDD RLM In-sync under Time Domain Measurement Resource Restriction with CRS assistance information | 12.6.0 |
| 12-2014 | RP-66 | RP-142149 | 2738 | - | | Corrections to E-UTRAN TDD RLM Out-of-sync under Time Domain Measurement Resource Restriction with CRS Assistance Information | 12.6.0 |
| 12-2014 | RP-66 | RP-142149 | 2740 | - | | Test case for inter-RAT HO to multicarrier UTRA | 12.6.0 |
| 12-2014 | RP-66 | RP-142178 | 2741 | - | | CR on parallel reporting criteria for eMBMS | 12.6.0 |
| 12-2014 | RP-66 | RP-142186 | 2742 | - | | Introduction of 2UL non-contiguous intra-band CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142021 | 2743 | - | | Introduction of 2UL inter-band CA | 12.6.0 |
| 12-2014 | RP-66 | RP-142150 | 2745 | - | | Requirements for multicarrier handover from EUTRA to UTRA | 12.6.0 |
| 03-2015 | RP-77 | RP-150387 | 2747 | - | | CR to Correct Implementation Error in FDD RSTD Measurement Reporting Delay Test Case and to Update Io Levels for Certain RSTD Test Cases | 12.7.0 |
| 03-2015 | RP-77 | RP-150382 | 2750 | - | | Remove incorrect note from CA RSTD Accuracy tests | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2751 | - | | Change Nprs value for 5MHz CA RSTD Accuracy tests | 12.7.0 |
| 03-2015 | RP-77 | RP-150066 | 2754 | 1 | | Maximum allowed layers for multiple monitoring for CA | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2756 | - | | DRX correction for interruption with dual connectivity | 12.7.0 |
| 03-2015 | RP-77 | RP-150388 | 2757 | - | | Correction of Interruptions with RSTD Measurements for 3DL CA | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2761 | 1 | | RRM requirements for ProSe | 12.7.0 |
| 03-2015 | RP-77 | RP-150396 | 2763 | 1 | | Updating the requirements applicability for TDD config 0 | 12.7.0 |
| 03-2015 | RP-77 | RP-150394 | 2764 | 1 | | Cleanup for RSRQ measurement requirement for SCE | 12.7.0 |
| 03-2015 | RP-77 | RP-150394 | 2774 | 1 | | Clean up the correction on discovery signal measurements | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2775 | 1 | | Correction on MBSFN measurements | 12.7.0 |
| 03-2015 | RP-77 | RP-150394 | 2776 | - | | Introduce CA measurement accuracy requirements for SCE | 12.7.0 |
| 03-2015 | RP-77 | RP-150382 | 2777 | - | | Correction on Io in carrier aggregation test cases | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2783 | - | | Introducing accuracy requirement for new RSRQ | 12.7.0 |
| 03-2015 | RP-77 | RP-150384 | 2785 | - | | Time-domain measurement resource restriction pattern for serving cell in feICIC RSRP and RSRQ test cases | 12.7.0 |
| 03-2015 | RP-77 | RP-150384 | 2791 | - | | CR on typo of referencing section name in CA measurements | 12.7.0 |
| 03-2015 | RP-77 | RP-150393 | 2797 | 1 | | Clarification including PSCell in Note 1 for Ecat | 12.7.0 |
| 03-2015 | RP-77 | RP-150386 | 2798 | 1 | | Clarification of IncMon requirements for E-UTRA idle state | 12.7.0 |
| 03-2015 | RP-77 | RP-150386 | 2799 | 1 | | Clarification of IncMon requirements for E-UTRA connected state | 12.7.0 |
| 03-2015 | RP-77 | RP-150386 | 2800 | 1 | | Clarification concerning IncMon scaling for non-gap-assisted measurements | 12.7.0 |
| 03-2015 | RP-77 | RP-150382 | 2803 | - | | Correction of RMC and OCNG pattern in event triggered tests without measurement gap | 12.7.0 |
| 03-2015 | RP-77 | RP-150394 | 2804 | - | | CR on RSRQ requirements for CRS based discovery signal | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2808 | - | | Correction to RRM test cases | 12.7.0 |
| 03-2015 | RP-77 | RP-150388 | 2809 | - | | Correction to CA Testing with Different CA Configurations | 12.7.0 |
| 03-2015 | RP-77 | RP-150393 | 2811 | - | | Principle to test synchronous and asynchronous DC requirements | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2814 | - | | Further revision of RSRP requirement for 36.133 release 12 | 12.7.0 |

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| 03-2015 | RP-77 | RP-150387 | 2815 | - | | Additional bandwidths for EUTRAN activation and deactivation of known and unknown SCell in non-DRX | 12.7.0 |
| 03-2015 | RP-77 | RP-150387 | 2816 | 1 | | High Doppler measurement accuracy requirements | 12.7.0 |
| 03-2015 | RP-77 | RP-150384 | 2817 | 1 | | 36.133 CR to change CPICH Ec/No to CPICH Ec/Io in EUTRA FDD to UTRA FDD HO test cases | 12.7.0 |
| 03-2015 | RP-77 | RP-150388 | 2822 | - | | Maximum Transmission Timing Difference in 3DL CA | 12.7.0 |
| 03-2015 | RP-77 | RP-150053 | 2824 | - | | Correction to the implementation of CR 2471r3 (Clarification for ACK/NACK feedback of CGI measurement) | 12.7.0 |
| 06-2015 | RP-68 | RP-150972 | 2825 | | | 3 DL CA Phase I tests # 1-2: Event triggered reporting tests with deactivated SCells in non-DRX for TDD-FDD CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2828 | | | RMC for 10 MHz for UE category 0 RRM tests | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2829 | | | Correction to measurement scaling factor for incmon | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2832 | | | RSRP requierment for SCE | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2833r1 | 1 | | CR on FDD-FDD inter-frequency absolute and relative CRS RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2834r1 | 1 | | CR on TDD-TDD inter-frequency absolute and relative CRS RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2835r1 | 1 | | CR on FDD absolute and relative CSI-RSRP accuracy test case for E-UTRAN Carrier Aggregation | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2836r1 | 1 | | CR on TDD absolute and relative CSI-RSRP accuracy test case for E-UTRAN Carrier Aggregation | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2837r1 | 1 | | CR on FDD-FDD inter-frequency absolute and relative CSI-RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2838r1 | 1 | | CR on TDD-TDD inter-frequency absolute and relative CSI-RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2839r1 | 1 | | CR on FDD intra frequency absolute and relative CSI-RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2840r1 | 1 | | CR on TDD intra frequency absolute and relative CSI-RSRP accuracy test case | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2842r1 | 1 | | Intra-frequency absolute and relative RSRP accuracies in CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2843r1 | 1 | | Absolute and relative RSRP accuracies for E-UTRAN Carrier Aggregation in CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2845r1 | 1 | | SCE FDD intra-frequency absolute RSRQ accuracy | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2846r1 | 1 | | SCE TDD intra-frequency absolute RSRQ accuracy | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2847 | | | SCE FDD absolute RSRQ accuracy for CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2848 | | | SCE TDD absolute RSRQ accuracy for CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2849r1 | 1 | | Test for CGI acqusition requirements for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2850r1 | 1 | | Test for cell identification for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2851 | | | Test for handover requirements for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2852 | | | Test for RRC re-establishment requirements for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2853r1 | 1 | | HD-FDD handover requirements for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2855r1 | 1 | | Correction of requirements for ProSe in DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2857r1 | 1 | | E-UTRAN FDD intra frequency CRS based discovery signal measurements when DRX is used | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2858r1 | 1 | | E-UTRAN TDD intra frequency CRS based discovery signal measurements when DRX is used | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2859r1 | 1 | | E-UTRAN FDD-FDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2860r1 | 1 | | E-UTRAN TDD-TDD inter-frequency event triggered reporting under fading propagation conditions in DRX based on CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2861r1 | 1 | | E-UTRAN FDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2862r1 | 1 | | E-UTRAN TDD event triggered reporting under deactivated SCell in non-DRX based on CRS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2866r1 | 1 | | RSRP accuracy FD-FDD Intra frequency case for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2867r1 | 1 | | RSRP accuracy HD-FDD Intra frequency case for UE category 0 | 12.8.0 |

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| 06-2015 | RP-68 | RP-150961 | 2868r1 | 1 | | RSRP accuracy TDD Intra frequency case for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2869r1 | 1 | | RSRQ accuracy FD-FDD Intra frequency case for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2870r1 | 1 | | RSRQ accuracy HD-FDD Intra frequency case for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2871r1 | 1 | | RSRQ accuracy TDD Intra frequency case for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2872r1 | 1 | | Test case for 3DL CA: PCell in FDD: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (TDD-FDD CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2873r1 | 1 | | Test case for 3DL CA: PCell in TDD: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (TDD-FDD CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2874r1 | 1 | | Test case for 3DL CA: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (FDD CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150968 | 2875r1 | 1 | | Test case for 3DL CA: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (TDD 3 DL CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2880 | | | OTDOA RSTD Measurements on different secondary component carriers | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 2884 | | | E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +20 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2885 | | | E-UTRAN TDD-TDD Inter-frequency event triggered reporting under fading propagation conditions in synchronous cells for 20 MHz +10 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 2886 | | | E-UTRAN TDD with 20 MHz +20 MHz bandwidth to UTRAN TDD cell search under fading propagation conditions R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2887 | | | E-UTRAN TDD with 20 MHz +10 MHz bandwidth to UTRAN TDD cell search under fading propagation conditions R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2897 | | | Further clarification of MBMSBLER reporting in section 9 | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2903r1 | 1 | | Test case of FDD-FDD inter-frequency RSRQ measurement accuracy in discovery signal occasions | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2904 | | | CR on side conditions for inter-frequency measurement for SCE | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2905 | | | CR on test case for RSRQ TDD-TDD inter frequency measurement accuracy requirement for SCE | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 2906r1 | 1 | | Maximum Rx difference between Pcell and Scell in section 7.9 | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2908r1 | 1 | | FDD-FDD intra frequency event triggered reporting in DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2909r1 | 1 | | TDD-TDD intra frequency event triggered reporting in DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2910r1 | 1 | | FDD-FDD inter frequency event triggered reporting in DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2911r1 | 1 | | TDD-TDD inter frequency event triggered reporting in DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2912r1 | 1 | | FDD event triggered reporting under deactivated SCell in non-DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2913r1 | 1 | | TDD event triggered reporting under deactivated SCell in non-DRX based on CSI-RS based discovery signal | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2915r2 | 2 | | CR of DC interruption requirements | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2916r1 | 1 | | Event triggered reporting on deactivated SCells in non-DRX (FDD CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2917r1 | 1 | | Event triggered reporting on deactivated SCells in non-DRX (TDD CA) | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2919r1 | 1 | | Introduction of RRM test case for E-UTRAN TDD-FDD 3 DL CA activation and deactivation of known SCell in non-DRX with PCell in FDD | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2920r1 | 1 | | Introduction of RRM test case for E-UTRAN TDD-FDD 3 DL CA activation and deactivation of known SCell in non-DRX with PCell in TDD | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2921 | | | 3DL CA Phase I tests #11_3DL FDD CA SCell activation and deactivation for known SCells without DRX | 12.8.0 |

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| 06-2015 | RP-68 | RP-150965 | 2921a | | | Correction of implementation of CR 2644 in Table A.9.8.1.1-1 | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2922 | | | 3DL CA Phase I tests #12_3DL TDD CA SCell activation and deactivation for known SCells without DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2922ar2 | 2 | | Incmon CR for FDD-FDD Interfrequency correct reporting of measurement events without reduced performance group configured, non DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2923r2 | 2 | | Incmon CR for TDD-TDD Interfrequency correct reporting of measurement events without reduced performance group configured, non DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2928r1 | 1 | | FDD RLM Test Case for Out-of-sync in DRX for PSCell in asynchronous DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2929r1 | 1 | | FDD RLM Test Case for In-sync in DRX for PSCell in asynchronous DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150954 | 2932 | | | Correction of Cell Time offset in RSTD CA Test cases (Rel-12) | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2933r1 | 1 | | Introduction of DC intra-frequency event triggered reporting with DRX in synchronous FDD DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2934r1 | 1 | | Introduction of DC intra-frequency event triggered reporting with DRX in synchronous TDD DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2935r1 | 1 | | Introduction of DC intra-frequency event triggered reporting with DRX in asynchronous FDD DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2936r1 | 1 | | Introduction of DC inter-frequency event triggered reporting with DRX in synchronous FDD DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2937r1 | 1 | | Introduction of DC inter-frequency event triggered reporting with DRX in synchronous TDD DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2938r1 | 1 | | Testcases for E-UTRA Incmon idle interfrequency reselection | 12.8.0 |
| 06-2015 | RP-68 | RP-150962 | 2940r2 | 2 | | CR on minimum number of subframes for discovery-based measurements | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2941r1 | 1 | | E-UTRAN FD-FDD Radio Link Monitoring Tests for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2942r1 | 1 | | E-UTRAN HD-FDD Radio Link Monitoring Tests for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2943r1 | 1 | | E-UTRAN TDD Radio Link Monitoring Tests for UE category 0 | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2944r1 | 1 | | Absolute and relative RSRP accuracies in FDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150968 | 2945r1 | 1 | | Absolute and relative RSRP accuracies in TDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2946r1 | 1 | | PCell in FDD: absolute and relative RSRQ accuracies in TDD-FDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 2947r1 | 1 | | PCell in TDD: absolute and relative RSRQ accuracies in TDD-FDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2950 | | | FDD-FDD Interfrequency correct reporting of measurement events with reduced performance group configured for non DRX IncMon | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2951 | | | TDD-TDD Interfrequency correct reporting of measurement events with reduced performance group configured for non DRX IncMon | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2952r1 | 1 | | E-UTRAN FDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2953r1 | 1 | | E-UTRAN TDD Radio Link Monitoring Test for In-sync in DRX for PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150961 | 2954r1 | 1 | | E-UTRAN FDD PCell interruption at transitions between active and non-active when DRX is used in PSCell in asynchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2955 | | | E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell for 20 MHz +10 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 2956 | | | E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG for 20 MHz +20 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2957 | | | E-UTRAN TDD - UE Transmit Timing Accuracy Tests for SCell in sTAG for 20 MHz +10 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 2958 | | | E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test for Scell in sTAG for 20 MHz +20 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2959 | | | E-UTRAN TDD – UE Timing Advance Adjustment Accuracy Test for Scell in sTAG for 20 MHz +10 MHz bandwidth R12 | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2962 | | | Addition PDSCH RMC for 5MHz with user data | 12.8.0 |

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| 06-2015 | RP-68 | RP-150972 | 2967r1 | 1 | | 3 DL CA Phase II tests # 1-2: RSRP measurement accuracies for TDD-FDD CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2971r1 | 1 | | PSCell Add and Release Delay Tests for Synchronous DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2972r1 | 1 | | PSCell Add and Release Delay Tests for Asynchronous DC | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2975r1 | 1 | | Idle mode FDD to UTRA FDD interRAT reselection | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2976r1 | 1 | | Idle mode TDD to UTRA FDD interRAT reselection | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2977 | | | E-UTRA FDD InterRAT UTRA FDD correct reporting of measurement events with reduced performance group configured, non DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2978 | | | E-UTRA TDD InterRAT UTRA FDD correct reporting of measurement events with reduced performance group configured, non DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2979r1 | 1 | | E-UTRAN FDD PCell interruption at transitions between active and non-active when DRX is used in PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2980r1 | 1 | | E-UTRAN TDD PCell interruption at transitions between active and non-active when DRX is used in PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2981r1 | 1 | | E-UTRAN FDD inter-frequency event triggered reporting in asynchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150958 | 2984r1 | 1 | | Modification for interruption period for SCell (de-)activation with 3DL | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2987r1 | 1 | | Test cases of Idle mode E-UTRA to UTRA TDD interRAT cell reselection for IncMon | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 2988r1 | 1 | | Test cases of Interfrequency correct reporting of measurement events with reduced performance group configured, DRX | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2989r2 | 2 | | E-UTRAN FDD Radio Link Monitoring Test for Out-of-sync in DRX for PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150963 | 2990r2 | 2 | | E-UTRAN TDD Radio Link Monitoring Test for Out-of-sync in DRX for PSCell in synchronous dual connectivity | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 2992 | | | CR on interruption during D2D discovery for D2D single RF chain | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2993 | | | CR on E-UTRAN TDD-TDD inter frequency measurements when DRX is used | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2998 | | | Test case of FDD-FDD inter-frequency new RSRQ measurement accuracy | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 2999 | | | Test case of TDD-TDD inter-frequency new RSRQ measurement accuracy | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 3001 | | | Correction to feICIC cell configurations in RLM | 12.8.0 |
| 06-2015 | RP-68 | RP-150955 | 3003 | | | Correction to A.8.1.8 | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3004r1 | 1 | | CR on absolute and relative RSRQ accuracies in TDD 3DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3005r1 | 1 | | CR on absolute and relative RSRQ accuracies in FDD 3DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 3006 | | | CR for test case of new RSRQ measurement accuracy in FDD | 12.8.0 |
| 06-2015 | RP-68 | RP-150965 | 3007 | | | CR for test case of new RSRQ measurement accuracy in TDD | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3008r1 | 1 | | RSTD measurement reporting in FDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3009r1 | 1 | | RSTD measurement reporting in TDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3010r1 | 1 | | RSTD measurement accuracy in FDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150972 | 3011r1 | 1 | | RSTD measurement accuracy in TDD 3 DL CA | 12.8.0 |
| 06-2015 | RP-68 | RP-150964 | 3012r2 | 2 | | Clarification of ProSe requirements in ONC | 12.8.0 |
| 06-2015 | RP-68 | RP-150957 | 3013 | | | Correction to Asynchronous Requirements for DC for only FDD-FDD | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 3014 | | | E-UTRA TDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured non DRX IncMon | 12.8.0 |
| 06-2015 | RP-68 | RP-150959 | 3015 | | | E-UTRA FDD InterRAT UTRA TDD correct reporting of measurement events with reduced performance group configured non DRX for IncMon | 12.8.0 |

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| 06-2015 | RP-68 | RP-150958 | 3016 | | | Correction to E-UTRA TDD event triggered reporting under deactivated SCell in non-DRX for 20 MHz + 10 MHz | 12.8.0 |
| 06-2015 | RP-68 | RP-150969 | 2893 | | | Carrier aggragation test cases for band 31 | 13.0.0 |
| 06-2015 | RP-68 | RP-150974 | 2966 | | | 4DL CA RRM requirements for “UE Measurements Procedures in RRC_CONNECTED State” | 13.0.0 |
| 06-2015 | RP-68 | RP-150974 | 2970 | 1 | | RRM Requirements in Section 7 for 4 DL CA | 13.0.0 |
| 09-2015 | RP-69 | RP-151475 | 3020 | - | | Correction of Ior/Ioc value in RRM Test case A.4.3.1.1 | 13.1.0 |
| 09-2015 | RP-69 | RP-151479 | 3022 | - | | Cleanup of 3DL CA RRM Test cases | 13.1.0 |
| 09-2015 | RP-69 | RP-151483 | 3031 | - | | Time offset between cells | 13.1.0 |
| 09-2015 | RP-69 | RP-151497 | 3032 | - | | Requirements for DC on ACK/NACK reporting for measurements using autonomous gaps | 13.1.0 |
| 09-2015 | RP-69 | RP-151475 | 3034 | - | | Interruptions at overlapping addition/release/activation/deactivation of SCells | 13.1.0 |
| 09-2015 | RP-69 | RP-151504 | 3035 | - | | RRM Requirements for 3 DL/2UL Inter-band CA | 13.1.0 |
| 09-2015 | RP-69 | RP-151483 | 3037 | - | | CR on editorial corrections in TS36133 in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151478 | 3039 | - | | CR on item title of table in clause 8.1.2.4.5.1 in TS36133 in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151500 | 3041 | - | | 3DL CA Phase II tests #15_ SCell activation and deactivation for unknown SCells without DRX (FDD 3 DL CA) in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151500 | 3043 | - | | 3DL CA Phase II tests #16_SCell activation and deactivation for unknown SCells without DRX (TDD 3 DL CA) in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151475 | 3045 | - | | Modifying test case of E-UTRAN 2DL TDD CA activation of unknown SCell in non-DRX in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151480 | 3047 | - | | CR on delete note in table 8.5.2.1.6.1-1 in TS36133 in Rel-13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151479 | 3052 | - | | Correction of inconsistency in 3 DL CA Event Triggered Reporting under Deactivated SCells in Non-DRX | 13.1.0 |
| 09-2015 | RP-69 | RP-151479 | 3054 | - | | CR on Interruptions at PSCell Addition/release | 13.1.0 |
| 09-2015 | RP-69 | RP-151483 | 3062 | - | | Corrections to the RMC configurations in 36.133 R13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151479 | 3064 | - | | Remove the Brackets in RLM Tests for UE category 0 R13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151474 | 3066 | 1 | | Adding SNR values to DC RLM test cases R13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151486 | 3068 | - | | Correction on Band 31 test cases R13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151483 | 3070 | - | | Correction to UE transmit timing accuracy tests R13 | 13.1.0 |
| 09-2015 | RP-69 | RP-151500 | 3078 | - | | Introduction of RRM test case for E-UTRAN TDD-FDD 3DL CA activation and deactivation of unknown SCell in non-DRX with PCell in TDD | 13.1.0 |
| 09-2015 | RP-69 | RP-151483 | 3079 | - | | Modifying test case of E-UTRAN 2DL FDD CA activation of unknown SCell in non-DRX | 13.1.0 |
| 09-2015 | RP-69 | RP-151500 | 3080 | - | | Introduction of RRM test case for E-UTRAN TDD-FDD 3DL CA activation and deactivation of unknown SCell in non-DRX with PCell in FDD | 13.1.0 |
| 12-2015 | RP-70 | RP-152131 | 3086 | - | | Correction of RSRQ value in RRM Serving Cell Test cases A.9.9.1, A.9.9.2 | 13.2.0 |
| 12-2015 | RP-70 | RP-152136 | 3088 | - | | Remove brackets in RSTD measurement accuracy R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3090 | - | | Remove bracket for CSI-RSRP measurement R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3094 | - | | Correction to E-UTRAN TDD-FDD CA Event Triggered Reporting Under Deactivated SCell in Non-DRX with PCell in FDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3096 | - | | Correction to E-UTRAN TDD-FDD CA Event Triggered Reporting Under Deactivated SCell in Non-DRX with PCell in TDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3098 | - | | Correction to E-UTRAN TDD-FDD CA Event triggered reporting on deactivated SCell with PCell interruption in non-DRX with PCell in FDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3100 | - | | Correction to E-UTRAN TDD-FDD CA Event triggered reporting on deactivated SCell with PCell interruption in non-DRX with PCell in TDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3102 | - | | Correction to RSRP for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3104 | - | | Correction to RSRP for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3106 | - | | Correction to RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in FDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3108 | - | | Correction to RSRQ for E-UTRAN TDD-FDD Carrier Aggregation with PCell in TDD R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152136 | 3114 | - | | Alignment of UE reporting criteria requirements | 13.2.0 |

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|---|---|---|---|---|---|---|---|
| 12-2015 | RP-70 | RP-152131 | 3116 | - | | Removal of square brackets for some CA requirements | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3118 | - | | Cleanup of 3DL CA RRM Test cases | 13.2.0 |
| 12-2015 | RP-70 | RP-152134 | 3121 | - | | Correction of definition of antenna connection in some RSTD tests | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3129 | - | | Different TDD configurations for OTDOA in CA in release 12 | 13.2.0 |
| 12-2015 | RP-70 | RP-152157 | 3131 | - | | Introduction of Band 67 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3136 | - | | Correction of definition of pTAG and psTAG | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3145 | - | | Title of new section A.7.4 in TS36.133 for Rel-13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3146 | - | | SNR levels and Reference channels for DC RLM test cases for Rel-13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152131 | 3150 | - | | Correction on measurement category for reporting criteria | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3167 | - | | Alignment of dB values for 2DL CA activation and deactivation Test cases | 13.2.0 |
| 12-2015 | RP-70 | RP-152135 | 3173 | - | | CR on editorial cleanup for D2D RRM requirements | 13.2.0 |
| 12-2015 | RP-70 | RP-152136 | 3178 | - | | Correction to Trstd values in 3DL RSTD Measurement Accuracy test cases | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3183 | - | | Update of 2DL CA activation and deactivation of unknown SCell Test cases A.8.16.19+A.8.16.20 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3185 | - | | Update of 3DL CA activation and deactivation of unknown SCell Test cases A.8.16.41+A.8.16.42 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3187 | - | | Update to RRM test case for E-UTRAN TDD-FDD 3DL CA activation and deactivation of unknown SCell in non-DRX with PCell in FDD | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3189 | - | | Update to RRM test case for E-UTRAN TDD-FDD 3DL CA activation and deactivation of unknown SCell in non-DRX with PCell in TDD | 13.2.0 |
| 12-2015 | RP-70 | RP-152136 | 3191 | - | | Correction to Cells in OTDOA assistance data in 3DL RSTD Measurement Reporting Delay test cases | 13.2.0 |
| 12-2015 | RP-70 | RP-152153 | 3192 | 2 | | CR on RS-SINR accuracy in 36.133 | 13.2.0 |
| 12-2015 | RP-70 | RP-152136 | 3195 | 1 | | Correction on RSRQ measurement report mapping R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152173 | 3196 | - | | Introduction of Band 45 into TS36.133 | 13.2.0 |
| 12-2015 | RP-70 | RP-152131 | 3211 | - | | Further Correction of Cell Time offset in RSTD CA test cases (Rel-13) | 13.2.0 |
| 12-2015 | RP-70 | RP-152155 | 3213 | 1 | | CR for clearification of band combination in 36133 | 13.2.0 |
| 12-2015 | RP-70 | RP-152166 | 3214 | 1 | | CR for RRM requirement up to 3UL CA in 36133 | 13.2.0 |
| 12-2015 | RP-70 | RP-152152 | 3216 | 1 | | CR on measurement performance requirements for UE reporting SSTD between MeNB and SeNB for dual connectivity enhancements | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3223 | - | | Adding the title of A.8.22 in TS 36.133 R13 | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3227 | - | | Correction on A.8.16.17 E-UTRAN FDD activation and deactivation of known SCell in non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3229 | - | | Correction on A.8.16.18 E-UTRAN TDD activation and deactivation of known SCell in non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3231 | - | | Correction on A.8.16.35 3 DL PCell in FDD CA Activation and Deactivation of Known SCell in Non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3233 | - | | Correction on A.8.16.36 3 DL PCell in TDD CA Activation and Deactivation of Known SCell in Non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3235 | - | | Correction on A.8.16.37 3DL FDD CA activation and deactivation of known SCell in non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3237 | - | | Correction on A.8.16.38 3DL TDD CA activation and deactivation of known SCell in non-DRX | 13.2.0 |
| 12-2015 | RP-70 | RP-152152 | 3238 | 1 | | CR on RRM requirements for SSTD reporting for Dual Connectivity | 13.2.0 |
| 12-2015 | RP-70 | RP-152152 | 3239 | 1 | | CR on maximum uplink timing difference for Dual Connectivity | 13.2.0 |
| 12-2015 | RP-70 | RP-152152 | 3240 | 1 | | CR on RRM requirements for 3 DL CC Dual connectivity | 13.2.0 |
| 12-2015 | RP-70 | RP-152152 | 3241 | 1 | | CR on requirements of interruption for 3 DL CC Dual connectivity | 13.2.0 |
| 12-2015 | RP-70 | RP-152163 | 3243 | 1 | | CR on RRM requirements for 5DL CC CA | 13.2.0 |
| 12-2015 | RP-70 | RP-152171 | 3250 | - | | Introduction of Band 65 | 13.2.0 |
| 12-2015 | RP-70 | RP-152172 | 3251 | - | | Introduction of Band 66 | 13.2.0 |
| 12-2015 | RP-70 | RP-152149 | 3253 | 2 | | SCell activation/deactivation delay for PUCCH SCell | 13.2.0 |
| 12-2015 | RP-70 | RP-152146 | 3256 | 1 | | Beacon RSSI Reporting Requirements | 13.2.0 |
| 12-2015 | RP-70 | RP-152148 | 3260 | 1 | | Core RRM requirements for LAA | 13.2.0 |
| 12-2015 | RP-70 | RP-152148 | 3262 | 1 | | LAA measurement requirements | 13.2.0 |
| 12-2015 | RP-70 | RP-152148 | 3263 | 1 | | LAA measurement accuracy requirements and measurement report mapping | 13.2.0 |

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| 12-2015 | RP-70 | RP-152153 | 3265 | - | | RS-SINR measurement requirements | 13.2.0 |
| 12-2015 | RP-70 | RP-152153 | 3268 | 1 | | RS-SINR measurement report mapping | 13.2.0 |
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| 12-2015 | RP-70 | RP-152135 | 3275 | - | | CR on ProSe UE transmission timing in Any Cell Selection State | 13.2.0 |
| 12-2015 | RP-70 | RP-152133 | 3279 | - | | Alignment of time when UE starts CSI reporting for activated SCell | 13.2.0 |
| 03/2016 | RP-71 | RP-160472 | 3317 | | B | RRM requirements for eMTC in IDLE mode in section 4 | 13.3.0 |
| 03/2016 | RP-71 | RP-160472 | 3355 | | B | Reference configuration for Rel-13 MTC | 13.3.0 |
| 03/2016 | RP-71 | RP-160472 | 3346 | 1 | B | CR on eMTC positioning | 13.3.0 |
| 03/2016 | RP-71 | RP-160472 | 3369 | 1 | B | Random access requirements for eMTC UEs | 13.3.0 |
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| 03/2016 | RP-71 | RP-160472 | 3354 | 1 | B | Radio link monitoring for Rel-13 MTC UE | 13.3.0 |
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| 03/2016 | RP-71 | RP-160473 | 3310 | 2 | F | CR of measurement performance on eD2D | 13.3.0 |
| 03/2016 | RP-71 | RP-160475 | 3347 | 1 | B | Correction to SSTD measurement accuracy and reporting range | 13.3.0 |
| 03/2016 | RP-71 | RP-160476 | 3366 | 1 | B | Measurement requirements in RRC CONNECTED state | 13.3.0 |
| 03/2016 | RP-71 | RP-160476 | 3367 | 2 | B | Measurement requirements in RRC IDLE state | 13.3.0 |
| 03/2016 | RP-71 | RP-160477 | 3341 | 1 | F | CR on RSSI measurement | 13.3.0 |
| 03/2016 | RP-71 | RP-160477 | 3351 | 1 | B | RSSI Report Mapping Requirements | 13.3.0 |
| 03/2016 | RP-71 | RP-160478 | 3362 | 1 | F | Corrections in measurement accuracy requirements for LAA | 13.3.0 |
| 03/2016 | RP-71 | RP-160488 | 3321 | | A | Correction to feICIC TDD RSRP accuracy OCNG in TS 36.133 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3283 | | A | CR for correction to syncOffsetIndicator parameter in D2D resource pool configuration | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3288 | | A | Change OGNG for 3DL CA Event Triggered Reporting on Deactivated SCell with PCell and SCell Interruptions, A.8.16.32+A.8.16.33 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3293 | | F | Correction of errors in Annex A Activation/Deactivation Test cases | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3323 | | A | CR on E-UTRAN TDD-FDD CA activation and deactivation of known SCell in non-DRX with PCell in FDD for Rel-13 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3326 | | A | CR on E-UTRAN TDD-FDD CA activation and deactivation of unknown SCell in non-DRX with PCell in FDD for Rel-13 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3344 | | A | Correction on SCE requirements and test cases R13 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3349 | | A | Correction to antenna configuration principle | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3372 | | A | CR for IncMon requirements alignment 36.133 Rel-13 | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3373 | | A | Editorial corrections | 13.3.0 |
| 03/2016 | RP-71 | RP-160489 | 3295 | 1 | F | Modification for MBSFN measurements for R13 | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3290 | | F | Correction to RS-SINR measurement accuracy requirements | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3297 | | F | Modification for interruptions with Carrier Aggregation | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3305 | | F | Clarification on timing of interruption for PUCCH SCell activation/deactivation | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3316 | | F | Activation and deactivation delay requirements for PUCCH SCell with four downlink SCells | 13.3.0 |
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| 03/2016 | RP-71 | RP-160490 | 3357 | | F | Interruptions on RSTD in CA | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3303 | 1 | F | Clarification of SSTD measurement requirements | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3361 | 1 | F | Corrections for intra-frequency measurement requirements for LAA | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3312 | 1 | F | CR on measurement and measurement accuracy for LAA | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3330 | 2 | F | Correction on LAA measurement conditions | 13.3.0 |
| 03/2016 | RP-71 | RP-160490 | 3363 | 2 | F | Reporting criteria for RS-SINR | 13.3.0 |

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| 03/2016 | RP-71 | RP-160490 | 3327 | 2 | F | Modification on the SCell activation delay requirement for deactivated SCell under Frame Structure 3 | 13.3.0 |
| 2016/06 | RP-72 | RP-161128 | 3374 | 1 | B | CR: MPDCCH RMCs for Cat-M1 RRM Tests | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3375 | 1 | B | CR: PDSCH RMCs for Cat-M1 RRM Tests | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3377 | 3 | F | CR: Intra-frequency handover requirements for Cat-M1 UEs in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3379 | 1 | F | CR: UE transmit timing Requirements for Cat-M1 UEs | 13.4.0 |
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| 2016/06 | RP-72 | RP-161141 | 3393 | | F | Introduction of test cases for E-UTRAN FDD-TDD and TDD-FDD DC interruption at transitions between active and non-active during DRX in synchronous DC | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3394 | | F | CR: Correction to Band 66 notes in E-UTRA band groups | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3395 | | F | New test cases: E-UTRAN TDD-FDD DC intra-frequency event triggered reporting with DRX in synchronous DC with PCell in FDD/PCell in TDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3396 | 1 | F | New test cases: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (FDD 4 DL CA and TDD 4 DL CA) | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3397 | 1 | F | New test cases: Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (FDD 5 DL CA and TDD 5 DL CA) | 13.4.0 |
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| 2016/06 | RP-72 | RP-161141 | 3404 | | A | CR on minimum ProSe SCH_RP condition on FDD_F | 13.4.0 |
| 2016/06 | RP-72 | RP-161130 | 3405 | | F | CR on minimum ProSe SCH_RP condition on FDD_F | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3406 | | F | CR of typo in interruption requirements | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3408 | | A | Editorial CR in RSRQ test case for CA in CRS based discovery signal | 13.4.0 |
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| 2016/06 | RP-72 | RP-161142 | 3418 | | F | Editorial correction in RRM requirements | 13.4.0 |
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| 2016/06 | RP-72 | RP-161141 | 3444 | | A | CR on E-UTRAN TDD-FDD CA activation and deactivation of unknown SCell in non-DRX with PCell in TDD for Rel-13 | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3446 | | A | Corrections on PDSCH RMC for UE category 0 R13 | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3450 | 1 | F | 5 DL FDD CA Event Triggered Reporting with Deactivated SCells in Non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3451 | 1 | F | 5 DL TDD CA Event Triggered Reporting with Deactivated SCells in Non-DRX | 13.4.0 |
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| 2016/06 | RP-72 | RP-161132 | 3466 | 1 | F | E-UTRAN TDD-FDD Addition and Release Delay of known PSCell in Synchronous DC with PCell in FDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161132 | 3467 | 1 | F | E-UTRAN TDD-FDD Addition and Release Delay of known PSCell in Synchronous DC with PCell in TDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3474 | 2 | F | maintenance on radio link monitoring for Rel-13 MTC UE | 13.4.0 |
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| 2016/06 | RP-72 | RP-161142 | 3478 | 1 | F | CR for eMTC RLM | 13.4.0 |
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| 2016/06 | RP-72 | RP-161142 | 3484 | 1 | F | Timing requirements for eMTC | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3487 | | A | Physical channels undefined in RRM Test cases A.9.1.22, A.9.1.23 | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3489 | | A | Cleanup of Dual Connectivity RRM Test cases | 13.4.0 |
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| 2016/06 | RP-72 | RP-161141 | 3506 | - | A | Corrections in A.8.16.12, A.8.16.21, A.8.16.22, A.8.16.30, A.9.1.15 and A.9.1.37 | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3510 | - | A | Editorial corrections | 13.4.0 |
| 2016/06 | RP-72 | RP-161134 | 3512 | - | B | CSI-RSRP measurement accuracy requirements | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3515 | - | F | A clarification on LAA band | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3516 | - | F | Editorial corrections for LAA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3519 | 1 | F | Inter-frequency measurement requirements | 13.4.0 |
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| 2016/06 | RP-72 | RP-161139 | 3528 | - | A | CR on correction for test cases in A.8.16.17x Rel-13 | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3530 | - | F | Editral correction for title in section A.8 and A.9 Rel-13 | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3533 | - | F | 3DL/3UL TDD CA - UE Transmit Timing Accuracy Tests for 2SCells | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3534 | 1 | F | Test cases for E-UTRAN DC Inter-frequency identification of a new CGI of E-UTRA cell using autonomous gaps | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3535 | 1 | B | UE Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161168 | 3536 | - | F | E-UTRAN 4DL CA activation and deactivation of know SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161168 | 3537 | - | F | E-UTRAN 5DL CA activation and deactivation of know SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3539 | - | A | PCC and SCC assignment in 20MHz+10MHz test case A.9.1.24 | 13.4.0 |
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| 2016/06 | RP-72 | RP-161132 | 3550 | - | B | Dual connectivity enhancements test case : SSTD delay in non DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3553 | - | F | Absolute and relative RSRP accuracies in FDD 4DL CA# 3 | 13.4.0 |
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| 2016/06 | RP-72 | RP-161142 | 3555 | 1 | F | PCell in FDD: absolute and relative RSRP accuracies in TDD-FDD 5 DL CA # 1 | 13.4.0 |

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| 2016/06 | RP-72 | RP-161142 | 3556 | 1 | F | PCell in TDD: absolute and relative RSRP accuracies in TDD-FDD 5 DL CA # 2 | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3557 | - | F | Absolute and relative RSRQ accuracies in 5 DL FDD CA # 7 | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3558 | - | F | Absolute and relative RSRQ accuracies in 5 DL TDD CA # 8 | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3559 | - | F | Test Case on Random Acces for 3 DL/3UL TDD CA | 13.4.0 |
| 2016/06 | RP-72 | RP-161129 | 3560 | 1 | B | SCell activation and deactivation of known PUCCH Scell in TDD CA without valid TA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3562 | - | F | E-UTRAN-WLAN RSSI event triggered reporting in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3563 | 1 | B | CR for Cat-M1 CEMode A RLM test cases: DRX FDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3564 | 1 | B | CR for Cat-M1 CEMode A RLM test cases: DRX HD-FDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3565 | 1 | B | CR for Cat-M1 CEMode A RLM test cases: DRX TDD | 13.4.0 |
| 2016/06 | RP-72 | RP-161132 | 3567 | - | B | CR on activation and deactivation of known SCell for 3DL CC DC | 13.4.0 |
| 2016/06 | RP-72 | RP-161132 | 3568 | - | B | CR on additional test requirements for Maximum transmission timing difference for DC | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3569 | - | F | CR on TDD-FDD 4DL CA activation and deactivation of known SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3570 | 1 | F | CR on TDD-FDD 5DL CA activation and deactivation of known SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3571 | - | F | CR on TDD-FDD 4DL CA activation and deactivation of unknown SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3572 | 1 | F | CR on TDD-FDD 5DL CA activation and deactivation of unknown SCell in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161126 | 3573 | 1 | B | CR on RRM requirements in Section 3 for NB-IoT | 13.4.0 |
| 2016/06 | RP-72 | RP-161126 | 3574 | 1 | B | Draft CR on RRM requirements in Annex B for NB-IoT | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3578 | 1 | F | Editorial corrections of an incorrect note for Band 32 | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3587 | 1 | F | Modification on intra-frequency discovery signal measurement requirements in LAA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3591 | 2 | F | Modification on CA requirements in LAA | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3596 | - | A | Correction of SCE event trigged reporting test cases for CSI-RS based discovery signal R13 | 13.4.0 |
| 2016/06 | RP-72 | RP-161129 | 3602 | 1 | B | 2DL/2UL TDD-FDD CA (TDD PCell) activation and deactivation of known PUCCH SCell without valid TA in non-DRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161132 | 3603 | - | B | CR: Introduction of testing principle for different combination of duplex modes DC | 13.4.0 |
| 2016/06 | RP-72 | RP-161141 | 3605 | - | A | CR of RLM requirement for PSCell in dual connectivity R12 | 13.4.0 |
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| 2016/06 | RP-72 | RP-161132 | 3607 | - | B | E-UTRAN FDD - FDD DC intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in asynchronous DC | 13.4.0 |
| 2016/06 | RP-72 | RP-161132 | 3608 | - | B | E-UTRAN TDD - TDD DC intra-frequency identification of a new CGI of E-UTRA cell using autonomous gaps in synchronous DC | 13.4.0 |
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| 2016/06 | RP-72 | RP-161142 | 3612 | - | F | PCell in FDD: absolute and relative RSRP accuracies in FDD-TDD 4DL CA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3613 | - | F | PCell in TDD: absolute and relative RSRP accuracies in TDD-FDD 4DL CA. | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3614 | - | F | absolute and relative RSRP accuracies in FDD 5 DL CA | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3615 | - | F | absolute and relative RSRP accuracies in TDD 5 DL CA | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3616 | 1 | B | E-UTRAN Intra frequency case for Cat-M1 UE in normal coverage | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3617 | 1 | B | E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions for Cat-M1 UE in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3618 | 1 | B | E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions for Cat-M1 UE in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3619 | 1 | B | E-UTRAN TDD-TDD intra-frequency event triggered reporting under fading propagation conditions for Cat-M1 UE in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3620 | 1 | B | CR on RSRP Intra frequency test cases for Cat-M1 UE in CEModeA | 13.4.0 |

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| 2016/06 | RP-72 | RP-161128 | 3621 | - | B | PRACH configuration for eMTC | 13.4.0 |
| 2016/06 | RP-72 | RP-161142 | 3622 | 2 | F | CR on eMTC eDRX | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3629 | 3 | B | FD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEModeA | 13.4.0 |
| 2016/06 | RP-72 | RP-161128 | 3630 | 3 | B | FD-FDD Radio Link Monitoring Test for In-sync for Cat-M1 UE in CEModeA | 13.4.0 |
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| 2016/06 | RP-72 | RP-161128 | 3632 | 3 | B | HD-FDD Radio Link Monitoring Test for In-sync for Cat-M1 UE in CEModeA | 13.4.0 |
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| 2016/06 | RP-72 | RP-161128 | 3634 | 3 | B | TDD Radio Link Monitoring Test for In-sync for Cat-M1 UE in CEModeA | 13.4.0 |
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| 2016/12 | RP-74 | RP-162384 | 4163 | 1 | A | CR on cell re-selection test case for Cat-M1 in normal coverage | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4167 | 1 | A | CR on RRC re-establishment test case for Cat-M1 in CE Mode A | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4169 | - | A | CR on RRC re-establishment test case for Cat-M1 in CE Mode B | 14.2.0 |
| 2016/12 | RP-74 | RP-162433 | 4170 | - | A | Correction of transmit timing for NB-IoT | 14.2.0 |
| 2016/12 | RP-74 | RP-162415 | 4175 | - | A | PCC and SCC assignment in 20MHz+10MHz test case A.8.20.2B and A.9.2.27 | 14.2.0 |
| 2016/12 | RP-74 | RP-162418 | 4178 | - | A | Remove redundant requirement for Intra-frequency relative CSI-RSRP | 14.2.0 |
| 2016/12 | RP-74 | RP-162420 | 4181 | - | A | Correct InformationBitPayload for Sub-Frame 1, 6 and Max T-put of TDD PDSCH RMC | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4185 | - | A | Correction to Es/Noc, Es/Iot and RSRP values in Idle mode re-selection test in normal coverage | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4187 | - | A | Corrections to rsrp-ThresholdsPrach and test requirement in Random Access Test in enhanced coverage | 14.2.0 |
| 2016/12 | RP-74 | RP-162405 | 4194 | - | B | Introduction of Band 48 to 36.133 | 14.2.0 |
| 2016/12 | RP-74 | RP-162435 | 4198 | - | A | 4 DL CA PCell in FDD FDD-TDD RSRQ for E-UTRAN in Carrier Aggregation | 14.2.0 |
| 2016/12 | RP-74 | RP-162435 | 4200 | - | A | 4 DL CA PCell in TDD TDD-FDD RSRQ for E-UTRAN in Carrier Aggregation | 14.2.0 |
| 2016/12 | RP-74 | RP-162435 | 4204 | - | A | 5 DL PCell in TDD RSRQ for E-UTRAN in Carrier Aggregation | 14.2.0 |
| 2016/12 | RP-74 | RP-162379 | 4206 | - | A | Clarification to applicability of NRSRQ for UE category NB1 | 14.2.0 |
| 2016/12 | RP-74 | RP-162433 | 4208 | - | A | Introducing agreed measurement period for NB IoT connected mode | 14.2.0 |
| 2016/12 | RP-74 | RP-162456 | 4210 | 2 | A | Introducing agreed measurement accuracy for NB IoT | 14.2.0 |
| 2016/12 | RP-74 | RP-162388 | 4217 | 2 | B | CR for RRM requirements in idle mode for high speed conditions | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4221 | - | A | CR: E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB (Rel-14) | 14.2.0 |
| 2016/12 | RP-74 | RP-162382 | 4223 | - | A | CR: E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeB (Rel-14) | 14.2.0 |
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| 2016/12 | RP-74 | RP-162391 | 4228 | 2 | B | CR to introduce handover requirements for mobility enhancement | 14.2.0 |
| 2016/12 | RP-74 | RP-162409 | 4229 | 1 | F | CR on reliability of GNSS | 14.2.0 |
| 2016/12 | RP-74 | RP-162386 | 4232 | 1 | A | CR for Inter-frequency event triggered reporting | 14.2.0 |
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| 2016/12 | RP-74 | RP-162379 | 4241 | - | A | CR for NPDCCH RMC R14 | 14.2.0 |
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| 2016/12 | RP-74 | RP-162383 | 4258 | - | A | Introduce 5MHz Bandwidth MPDCCH Reference Channel for Cat-M1 UE R14 | 14.2.0 |
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| 2016/12 | RP-74 | RP-162392 | 4293 | 3 | B | CR on interruption requirements in SRS switching | 14.2.0 |
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| 2016/12 | RP-74 | RP-162414 | 4354 | - | A | PCFICH/PDCCH/PHICH Reference channel in UE Cat 0 new CGI RRM test cases | 14.2.0 |
| 2016/12 | RP-74 | RP-162392 | 4355 | 1 | B | Requirements with SRS carrier based switching | 14.2.0 |
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| 2016/12 | RP-74 | RP-162380 | 4364 | 1 | A | CR on RLM in-sync test without DRX under enhanced coverage | 14.2.0 |
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| 2016/12 | RP-74 | RP-162407 | 4366 | - | B | Introduction of new bands for NB-IoT in 36.133 | 14.2.0 |
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| 2017/03 | RP-75 | RP-170598 | 4388 | 1 | F | CR Update to Radio Link Monitoring Requirements for NB-IoT | 14.3.0 |
| 2017/03 | RP-75 | RP-170598 | 4390 | | A | Correction CR on RRC_IDLE state requirements for NB-IOT | 14.3.0 |
| 2017/03 | RP-75 | RP-170563 | 4391 | 2 | B | CR for RRM core requirement for Cat.1 UE with single receiver chain (Part 1) | 14.3.0 |
| 2017/03 | RP-75 | RP-170563 | 4392 | 1 | B | CR for RRM core requirement for Cat.1 UE with single receiver chain (Part 2) | 14.3.0 |
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| 2017/03 | RP-75 | RP-170596 | 4399 | | A | Corrections to UE Cat M1 Intra-frequency Event triggered Reporting CE Mode A Test Cases | 14.3.0 |
| 2017/03 | RP-75 | RP-170588 | 4401 | | A | Correct 4DL Act-deact Unknown SCell Test Cases A.8.16.63 and A.8.16.64 | 14.3.0 |
| 2017/03 | RP-75 | RP-170600 | 4403 | | A | Correct parameters for UE Category NB1 Reselection Test Case A.4.2.18 | 14.3.0 |

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| 2017/03 | RP-75 | RP-170595 | 4405 | | A | Correct Frequency hopping parameters for UE Cat M1 PDSCH Reference channel | 14.3.0 |
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| 2017/03 | RP-75 | RP-170559 | 4428 | 1 | B | CR on Initiation/Cease of SLSS Transmissions | 14.3.0 |
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| 2017/03 | RP-75 | RP-170579 | 4443 | | F | CR on HST connected mode measurement requirement | 14.3.0 |
| 2017/03 | RP-75 | RP-170557 | 4444 | | F | CR to finalize handover requirements for further mobility enhancement | 14.3.0 |
| 2017/03 | RP-75 | RP-170594 | 4448 | | A | Correction to core requirement of RRC re-establishment in Cat-m1 | 14.3.0 |
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| 2017/03 | RP-75 | RP-170597 | 4452 | 1 | A | Removing square brackets from RLM test case in Cat-m1 | 14.3.0 |
| 2017/03 | RP-75 | RP-170554 | 4459 | 1 | B | CR on UE transmission timing accuracy test for V2V | 14.3.0 |
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| 2017/03 | RP-75 | RP-170559 | 4461 | 2 | B | CR on Selection / Reselection of Synchronization Reference for V2X | 14.3.0 |
| 2017/03 | RP-75 | RP-170559 | 4462 | 1 | B | CR on S-RSSI measurement accuracy requirement for V2X | 14.3.0 |
| 2017/03 | RP-75 | RP-170559 | 4463 | 1 | B | CR on Congestion Control Measurements Requirements for V2X | 14.3.0 |
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| 2017/03 | RP-75 | RP-170601 | 4472 | | A | Remove square brackets in NB-IoT performance requirement R14 | 14.3.0 |
| 2017/03 | RP-75 | RP-170581 | 4477 | | A | Correction on test parameter in RSRP Intra frequency case for UE category 0 R14 | 14.3.0 |
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| 2017/03 | RP-75 | RP-170595 | 4482 | | A | Correction of 8.13 Measurements for UE Category M1 R14 | 14.3.0 |
| 2017/03 | RP-75 | RP-170564 | 4484 | 1 | A | CR on WLAN RSSI R14 | 14.3.0 |
| 2017/03 | RP-75 | RP-170594 | 4489 | 1 | A | Not implement CRs for eMTC R14 | 14.3.0 |
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| 2017/03 | RP-75 | RP-170600 | 4508 | | A | CR for the correction on the testcases of HD-FDD Radio Link Monitoring for UE category NB1 in R14 | 14.3.0 |
| 2017/03 | RP-75 | RP-170603 | 4510 | 1 | A | Correction on measurement performance requirements for UE category M1 in R14 | 14.3.0 |
| 2017/03 | RP-75 | RP-170585 | 4513 | | A | CR for the correction on the testcases of Proximity-based Services and measurement performance requirement in R14 | 14.3.0 |
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| 2017/03 | RP-75 | RP-170591 | 4518 | 1 | F | Remove the bracket in LAA requirements R14 | 14.3.0 |
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| 2017/03 | RP-75 | RP-170595 | 4545 | | A | Correction to Cat-M1 UE RRC re-establishment tests | 14.3.0 |
| 2017/03 | RP-75 | RP-170581 | 4550 | | A | Correction of RMC reference in the cat-0 HD-FDD intra-frequency test case | 14.3.0 |

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| 2017/03 | RP-75 | RP-170560 | 4554 | 3 | B | Introducing intra-frequency measurement requirements for UE category M2 in normal coverage/CEModeA | 14.3.0 |
| 2017/03 | RP-75 | RP-170560 | 4555 | 1 | B | Introducing intra-frequency measurement requirements for UE category M2 in enhanced coverage/CEModeB | 14.3.0 |
| 2017/03 | RP-75 | RP-170560 | 4556 | 2 | B | Introducing inter-frequency measurement requirements for UE category M2 in normal coverage/CEModeA | 14.3.0 |
| 2017/03 | RP-75 | RP-170560 | 4557 | 3 | B | Introducing inter-frequency measurement requirements for UE category M2 in enhanced coverage/CEModeB | 14.3.0 |
| 2017/03 | RP-75 | RP-170598 | 4565 | | A | Correction to redirection to NB-IoT non-anchor carrier | 14.3.0 |
| 2017/03 | RP-75 | RP-170594 | 4567 | | A | Correction to RRC release with redirection in eMTC | 14.3.0 |
| 2017/03 | RP-75 | RP-170582 | 4575 | 1 | A | PCC and SCC assignment in 20MHz+10MHz test case A.8.16.21 and A.8.20.4B | 14.3.0 |
| 2017/03 | RP-75 | RP-170603 | 4578 | 1 | A | 5 DL PCell in FDD RSRQ for E-UTRAN in Carrier Aggregation | 14.3.0 |
| 2017/03 | RP-75 | RP-170598 | 4582 | 1 | A | Capturing agreements for NB-IoT | 14.3.0 |
| 2017/03 | RP-75 | RP-170591 | 4598 | 3 | F | LAA SCC requirements with multiple SCCs | 14.3.0 |
| 2017/03 | RP-75 | RP-170553 | 4599 | 1 | F | Correction in UE transmit Timing Requirements with eLAA SCell | 14.3.0 |
| 2017/03 | RP-75 | RP-170592 | 4601 | | A | Correction of LAA RRM test cases | 14.3.0 |
| 2017/06 | RP-76 | RP-171309 | 4603 | | A | PDSCH allocation parameters for UE Cat M1 RSRP Test Cases | 14.4.0 |
| 2017/06 | RP-76 | RP-171303 | 4605 | | F | Cat NB1 RRM Test Case A.4.2.18/19 update for 5MHz Ch BW | 14.4.0 |
| 2017/06 | RP-76 | RP-171278 | 4606 | | F | CR on applicability of requirements for CA | 14.4.0 |
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| 2017/06 | RP-76 | RP-171309 | 4621 | | A | eMTC RRM: Correction to prach test cases (Rel-14) | 14.4.0 |
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| 2017/06 | RP-76 | RP-171264 | 4629 | | B | RSTD requirements for short MGL | 14.4.0 |
| 2017/06 | RP-76 | RP-171283 | 4633 | 1 | F | Correction to RRC connected state requirements for CA | 14.4.0 |
| 2017/06 | RP-76 | RP-171284 | 4636 | 1 | F | CR on CGI reading requirement with SRS switching | 14.4.0 |
| 2017/06 | RP-76 | RP-171308 | 4650 | 1 | A | CR on measurement condition in B.1.3 R14 | 14.4.0 |
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| 2017/06 | RP-76 | RP-171269 | 4707 | 1 | B | CR for RRM measurement requirement for Cat.1bis UE | 14.4.0 |
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| 2017/06 | RP-76 | RP-171309 | 4714 | | A | Correction to event triggered reporting test cases in eMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171299 | 4716 | | A | Correction to inter-frequency requirements in NB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171288 | 4719 | 1 | F | Clarification on requirements for RSTD based on CRS and PRS | 14.4.0 |
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| 2017/06 | RP-76 | RP-171267 | 4728 | 1 | B | Requirements on NPRACH Transmission in Enhanced NB-IoT | 14.4.0 |
| 2017/06 | RP-76 | RP-171299 | 4760 | | A | Maintenance of core requirements for UE Cat.NB1 R14 | 14.4.0 |
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| 2017/06 | RP-76 | RP-171301 | 4766 | | A | CR for PHR requirement for NB-IoT R14 | 14.4.0 |
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| 2017/06 | RP-76 | RP-171301 | 4772 | | A | CR on Io range for NB-IoT measurement accuracy R14 | 14.4.0 |
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| 2017/06 | RP-76 | RP-171302 | 4778 | 1 | F | Correction on T2 time duration for RLM in-sync test R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4797 | 3 | B | CR on UE Rx-Tx measurement requirement for FeMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4798 | 1 | B | CR on UE Rx-Tx accuracy requirement for FeMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171262 | 4808 | | B | Test case for CA interruption at SRS carrier based switching | 14.4.0 |
| 2017/06 | RP-76 | RP-171262 | 4809 | 1 | B | Test case for DC interruption at SRS carrier based switching | 14.4.0 |
| 2017/06 | RP-76 | RP-171257 | 4812 | 1 | B | CR on measurement accuracy requirements under high speed scenarios | 14.4.0 |
| 2017/06 | RP-76 | RP-171257 | 4813 | 5 | B | Test case for cell reselection on idle mode under high speed scenario | 14.4.0 |
| 2017/06 | RP-76 | RP-171257 | 4814 | 3 | B | Test case for measurement reporting on connected mode under high speed scenario | 14.4.0 |
| 2017/06 | RP-76 | RP-171283 | 4815 | 1 | F | Remove bracket in measurement core requirements in high speed | 14.4.0 |
| 2017/06 | RP-76 | RP-171296 | 4816 | | F | Correction on Io for SCE test case A.8.22.8 | 14.4.0 |
| 2017/06 | RP-76 | RP-171309 | 4819 | | A | CR on RA test for Cat-M1 normal coverage R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4821 | 3 | F | Refinement of idle mode requirements for feMTC in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4823 | 1 | B | CR on NRSRP mapping table | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4824 | | B | CR on NRSRQ mapping table | 14.4.0 |
| 2017/06 | RP-76 | RP-171256 | 4829 | | F | CR on V2V RRM performance requirements corrections | 14.4.0 |
| 2017/06 | RP-76 | RP-171282 | 4830 | 1 | F | CR on V2X RRM core requirements corrections | 14.4.0 |
| 2017/06 | RP-76 | RP-171307 | 4834 | | A | LAA RRM: Correction to test case A.9.11.x and A.9.12.x (Rel-14) | 14.4.0 |
| 2017/06 | RP-76 | RP-171309 | 4836 | | A | eMTC RRM: Correction to MPDCCH and PDSCH Reference Measurement Channels (Rel-14) | 14.4.0 |
| 2017/06 | RP-76 | RP-171281 | 4837 | | F | CR on side condition for reliability of GNSS | 14.4.0 |
| 2017/06 | RP-76 | RP-171298 | 4839 | 1 | A | Correction to RRM 4DL FDD CA test cases | 14.4.0 |
| 2017/06 | RP-76 | RP-171307 | 4841 | | A | Corrections to LAA Event-triggered reporting Test Cases A.8.26 | 14.4.0 |
| 2017/06 | RP-76 | RP-171299 | 4843 | | A | Rel-14 CR on the applicability of RRC procedures | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4844 | 1 | B | E-UTRAN FDD - FDD Intra frequency RACH-less handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4845 | 1 | B | E-UTRAN FDD - FDD Inter frequency RACH-less handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4846 | 1 | B | E-UTRAN TDD - TDD Intra frequency RACH-less handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4847 | 1 | B | E-UTRAN TDD - TDD Inter frequency RACH-less handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171264 | 4853 | 1 | B | E-UTRAN FDD-FDD Inter-frequency event triggered reporting with MGL=3ms under fading propagation conditions in synchronous cells | 14.4.0 |
| 2017/06 | RP-76 | RP-171264 | 4854 | 1 | B | E-UTRAN TDD-TDD Inter-frequency event triggered reporting with MGL=3ms under fading propagation conditions in synchronous cells | 14.4.0 |
| 2017/06 | RP-76 | RP-171298 | 4860 | | A | CA RRM: 4DL CA test parameter correction for A.8.16.51 and A.8.16.52 (Rel-14) | 14.4.0 |
| 2017/06 | RP-76 | RP-171296 | 4863 | | A | PCC and SCC assignment in 20MHz+10MHz test case A.8.16.22 | 14.4.0 |
| 2017/06 | RP-76 | RP-171264 | 4864 | 1 | B | Introduction of additional gap patterns and measurement capabilities for measurement gap enhancement | 14.4.0 |
| 2017/06 | RP-76 | RP-171265 | 4867 | 1 | B | CR on reference configurations for V2X RRM | 14.4.0 |
| 2017/06 | RP-76 | RP-171281 | 4868 | 1 | B | Correction on reliability of GNSS singal for V2V | 14.4.0 |
| 2017/06 | RP-76 | RP-171282 | 4869 | 1 | B | CR on reliability of GNSS singal for V2X | 14.4.0 |
| 2017/06 | RP-76 | RP-171301 | 4873 | | A | CR on T311 timer in RRC re-establishment test case R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171300 | 4875 | | A | Introduce NPDCCH RMC with DCI format N0 R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171302 | 4877 | | A | Correction on UE transmit timing test for NB-IoT R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171303 | 4879 | | A | Correction on timing advance test for NB-IoT R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171299 | 4881 | | A | Maintenance CR on NB-IoT core requirements R14 | 14.4.0 |

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| 2017/06 | RP-76 | RP-171302 | 4883 | | A | Correction on side condition for RRC re-establishment test cases R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4885 | | B | E-UTRAN FDD - UE Transmit Timing Accuracy Test for RACH-less Handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4886 | | B | E-UTRAN TDD - UE Transmit Timing Accuracy Test for RACH-less Handover | 14.4.0 |
| 2017/06 | RP-76 | RP-171310 | 4888 | | A | Correction on transmit timing requirement R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4889 | 1 | B | CR on intra frequency RSTD measurement requirement for eNB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4890 | 1 | B | CR on inter frequency RSTD measurement requirement for eNB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4891 | 1 | B | CR on intra frequency RSTD accuracy requirement for eNB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171267 | 4892 | 1 | B | CR on inter frequency RSTD accuracy requirement for eNB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4893 | 1 | B | CR on intra frequency RSTD measurement requirement for FeMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4894 | 1 | B | CR on inter frequency RSTD measurement requirement for FeMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4906 | 1 | B | CR on applicability rule for FeMTC in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4909 | 1 | A | CR on UE timer accuracy for FeMTC in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171311 | 4911 | 1 | A | 4DL FDD RSRQ for E-UTRAN in Carrier Aggregation in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171311 | 4913 | 1 | A | 4DL TDD RSRQ for E-UTRAN in Carrier Aggregation in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171311 | 4915 | 1 | A | Correction on the test cases of RLM for Cat-M1 UE in R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171282 | 4917 | 1 | F | CR on Modification of Selection/Reselection of V2X Synchronization Reference | 14.4.0 |
| 2017/06 | RP-76 | RP-171265 | 4918 | | B | CR on UE Transmission Timing Accuracy Tests for V2X | 14.4.0 |
| 2017/06 | RP-76 | RP-171285 | 4926 | | F | Modification on LAA measurement considering Inter-frequency RSSI measurement R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171307 | 4928 | | A | Corrections on the LAA test cases R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171297 | 4931 | | A | Update of some SCE test case | 14.4.0 |
| 2017/06 | RP-76 | RP-171311 | 4933 | | A | Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (FDD-TDD 4DL CA) R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171311 | 4935 | | A | Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (TDD-FDD 4 DL CA) R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171303 | 4937 | | A | Inter-frequency cell reselection under enhanced coverage for NB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4938 | 3 | B | CONNECTED mode requirements for feMTC UEs in CEModeA | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4939 | 3 | B | CONNECTED mode requirements for feMTC UEs in CEModeB | 14.4.0 |
| 2017/06 | RP-76 | RP-171308 | 4941 | 1 | A | Timing advance requirements for Cat M1 UEs | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4942 | 1 | B | Introduction of enhanced RLM requirements for feMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171303 | 4953 | | A | Contention Based Random Access Test for UE category NB1 UEs in Normal Coverage | 14.4.0 |
| 2017/06 | RP-76 | RP-171303 | 4955 | | A | Contention Based Random Access Test for UE category NB1 UEs in Enhanced Coverage | 14.4.0 |
| 2017/06 | RP-76 | RP-171302 | 4956 | | A | CR: NB-IoT Radio Link Monitoring Performance Test for Out-of-Sync in Enhanced Coverage | 14.4.0 |
| 2017/06 | RP-76 | RP-171297 | 4959 | 1 | A | Correction to RSTD test cases for carrier aggregation (R14) | 14.4.0 |
| 2017/06 | RP-76 | RP-171269 | 4960 | 1 | B | CR for RSTD measurement requirement for Cat.1bis UE | 14.4.0 |
| 2017/06 | RP-76 | RP-171302 | 4963 | | A | Correction to inter-frequency RRC re-establishment test case in NB-IOT | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4968 | | B | CR for E-UTRAN TDD intra-frequency MBB handover test cases | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4969 | | B | CR for E-UTRAN FDD intra-frequency MBB handover test cases | 14.4.0 |
| 2017/06 | RP-76 | RP-171259 | 4970 | | F | CR for correction of handover test cases | 14.4.0 |
| 2017/06 | RP-76 | RP-171286 | 4971 | | F | CR for correction of handover requirements for mobility enhancement | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4972 | 1 | B | Enhanced Handover Requirement for FeMTC | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4974 | | F | CR on 36.133: Intra and inter-frequency RSRP and RSRQ measurement accuracies for UE cat M1 | 14.4.0 |
| 2017/06 | RP-76 | RP-171285 | 4982 | 1 | F | Requirements applicability for eLAA | 14.4.0 |
| 2017/06 | RP-76 | RP-171307 | 4984 | | A | Corrections in LAA requirements | 14.4.0 |

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|---|---|---|---|---|---|---|---|
| 2017/06 | RP-76 | RP-171261 | 4985 | 4 | B | RRM requirements with eMBMS enhancements | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4986 | 1 | F | Measurement requirements under discontonuous MPDCCH monitoring | 14.4.0 |
| 2017/06 | RP-76 | RP-171266 | 4990 | 1 | F | Introducing gapless measurement requirement for eMTC R14 | 14.4.0 |
| 2017/06 | RP-76 | RP-171264 | 4997 | 1 | B | Introduction of test cases for burst gap | 14.4.0 |
| 2017/06 | RP-76 | RP-171264 | 4998 | 1 | B | Introduction of test cases for NCSG | 14.4.0 |
| 2017/09 | RP-77 | RP-171933 | 5004 | 2 | B | Introduction of event triggered reporting LAA test cases for multiple Scells | 14.5.0 |
| 2017/09 | RP-77 | RP-171967 | 5007 | | A | Updates to Intra-freq Event-triggered reporting Test cases for UE Cat 0 | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5009 | | A | Reference Channels in UE Cat M1 RRC Re-establishment test cases | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5011 | | A | OCNG and RMCs in UE Cat M1 Handover TCs | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5015 | | A | Es/Iot and RSRP values in UE Cat M1 Re-selection test cases | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5017 | | A | Reference PRACH Configurations for Cat M1 test cases | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5019 | | A | PRACH Configurations and parameters for Cat M1 test cases A.6.2.10/11/12 | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5021 | | A | PRACH Configuration for Cat M1 test case A.6.2.15 This CR was NOT implemented as it didn't use revison marks | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5025 | | A | Correction to RLM test cases Category NB1. | 14.5.0 |
| 2017/09 | RP-77 | RP-171973 | 5028 | | A | CA RRM: Correction of Cell 3 Es/Iot for T2 and T4 for TC A.8.16.55 and 56 (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171967 | 5031 | | A | CA RRM: Correction of PRS Subframe Offset for TC A.8.17.10 and A.8.17.11 (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5033 | | A | eMTC RRM: Corrections to Timing Advance Adjustment Accuracy test for Cat-M1 UE (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5035 | | A | NB-IoT RRM: Correction of antenna configuration of LTE and NBIoT cells in Inband RRM scenarios (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5037 | | A | NB-IoT RRM: Corrections to the NOCNG definition (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171943 | 5042 | | F | Update applicability of V2V Interruption requriement | 14.5.0 |
| 2017/09 | RP-77 | RP-171943 | 5043 | | F | Correction to V2X requirements for Initiation/Cease of SLSS transmissions | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5044 | 1 | B | CR on measurement performance scaling with MPDCCH monitoring CEModeA | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5045 | 1 | B | CR on measurement performance scaling with MPDCCH monitoring CEModeB | 14.5.0 |
| 2017/09 | RP-77 | RP-171943 | 5055 | 1 | F | Remove bracket in V2X core requirements | 14.5.0 |
| 2017/09 | RP-77 | RP-171969 | 5058 | | A | Correction CR on adding band group to RS-SINR measurement conditions | 14.5.0 |
| 2017/09 | RP-77 | RP-171932 | 5061 | 2 | B | RRM requirements with FeMBMS | 14.5.0 |
| 2017/09 | RP-77 | RP-171941 | 5062 | 1 | F | CR for correcting transmit timing requirement of eLAA | 14.5.0 |
| 2017/09 | RP-77 | RP-171943 | 5066 | | F | Clarification on V2X requirements for V2X UEs in RRC_CONNECTED state | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5068 | 1 | F | Gapsharing due to RSTD measurements for Rel-14 MTC in CEModeA | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5070 | 1 | F | Gap sharing due to RSTD measurements for Rel-14 MTC in CEModeB | 14.5.0 |
| 2017/09 | RP-77 | RP-171935 | 5073 | | F | CR on evaluation time of GNSS synchronization source reliability | 14.5.0 |
| 2017/09 | RP-77 | RP-171943 | 5076 | | F | Completing V2V Interruption test case | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5078 | | A | NB-IoT RRM: Corrections to invalid configuration for In-band Intra-frequency scenairos (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171968 | 5080 | | A | LAA RRM: Remove Square brackets from TCs A.9.1.60 and A.9.1.61 (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171971 | 5082 | | A | eMTC RRM: MPDSCH Repetitions in CEModeA test cases with DRX (Rel-14) | 14.5.0 |
| 2017/09 | RP-77 | RP-171932 | 5083 | 1 | B | RRM performance requirements with FeMBMS | 14.5.0 |
| 2017/09 | RP-77 | RP-171940 | 5084 | | F | CR on BS synchronization requirements for eMBMS enhancements | 14.5.0 |
| 2017/09 | RP-77 | RP-171935 | 5085 | | B | CR on Initiation/Cease of SLSS Transmissions Tests for V2X | 14.5.0 |
| 2017/09 | RP-77 | RP-171935 | 5086 | | B | CR on Synchronization Reference Selection / Reselection Tests for V2X | 14.5.0 |
| 2017/09 | RP-77 | RP-171935 | 5088 | 1 | B | CR on Congestion Control Measurement Tests for V2X | 14.5.0 |
| 2017/09 | RP-77 | RP-171935 | 5089 | 1 | B | CR on Interruptions Tests for V2X | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5095 | | A | Correction on RLM core requirements for NB-IoT | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5097 | 1 | F | Correction on cell reselection test case for NB-IoT | 14.5.0 |

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|---|---|---|---|---|---|---|---|
| 2017/09 | RP-77 | RP-171937 | 5099 | 1 | B | Introduce 5MHz NPDSCH RMC pattern for NB-IoT | 14.5.0 |
| 2017/09 | RP-77 | RP-171937 | 5100 | | B | Introduce 5MHz NPDCCH RMC pattern for NB-IoT | 14.5.0 |
| 2017/09 | RP-77 | RP-171937 | 5101 | | B | Correction on RRC re-establishment test case for NB-IoT | 14.5.0 |
| 2017/09 | RP-77 | RP-171973 | 5103 | | A | Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (FDD-TDD 5DL CA) | 14.5.0 |
| 2017/09 | RP-77 | RP-171973 | 5105 | | A | Event triggered reporting on deactivated SCells and interruption probability (0.5%) without DRX (TDD-FDD 5DL CA) | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5106 | | F | Correction on the applicability rules for FeMTC in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5107 | 1 | F | Correction on the measurement requirement for FeMTC in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5108 | 1 | B | CR on conditions for E-UTRAN inter-frequency measruements by UE cat M1 in RRC_CONNECTED State in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5109 | 2 | B | CR on conditions for measurements procedures in RRC_CONNECTED State for cat M2 in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5110 | 1 | B | CR on conditions for measurements procedures in RRC_IDLE State for cat M2 in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171940 | 5112 | 1 | F | CR on correction on the band groups in R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171933 | 5116 | 1 | B | FDD-TDD 3DL Event triggered reporting on deactivated FS3 SCell and FDD PCell interruption in non-DRX | 14.5.0 |
| 2017/09 | RP-77 | RP-171933 | 5117 | 1 | B | TDD-TDD 3DL Event triggered reporting on deactivated FS3 SCell and FDD PCell interruption in non-DRX | 14.5.0 |
| 2017/09 | RP-77 | RP-171969 | 5119 | | A | CR on RSRP range of eMTC Rel-14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5120 | 1 | F | CR on intra frequency RSTD measurement requirement for FeMTC | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5121 | 1 | F | CR on inter frequency RSTD measurement requirement for FeMTC | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5127 | 1 | F | CR on 36.133 Intra and inter-frequency RSRP and RSRQ measurement accuracies for UE cat M1 | 14.5.0 |
| 2017/09 | RP-77 | RP-171972 | 5129 | 1 | F | CR for NB-IoT Transmit Timing Test | 14.5.0 |
| 2017/09 | RP-77 | RP-171969 | 5133 | 1 | A | Restructuring of Handover Requirements in FeMTC | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5134 | | F | Corrections to enhanced RLM core requirements | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5135 | | F | Corrections to E-CID UE Rx-Tx requirements | 14.5.0 |
| 2017/09 | RP-77 | RP-171973 | 5139 | | F | Correction to LAA RRM measurement requirement R14 | 14.5.0 |
| 2017/09 | RP-77 | RP-171932 | 5141 | 2 | B | Inter-frequency measurement requirement for FeMBMS unicast mixed cell | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5143 | 2 | B | CR on inter frequency RSTD accuracy requirement for FeMTC | 14.5.0 |
| 2017/09 | RP-77 | RP-171936 | 5145 | 1 | B | CR on UE Rx-Tx accuracy requirement for FeMTC | 14.5.0 |
| 2017/09 | RP-77 | RP-171973 | 5146 | | A | Correction to LAA RRM test cases | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5147 | | F | CR on UE Rx - Tx measurement requirement for Cat-M1 | 14.5.0 |
| 2017/09 | RP-77 | RP-171942 | 5148 | | F | CR on UE Rx - Tx measurement requirement for Cat-M2 | 14.5.0 |
| 2017/09 | RP-77 | RP-171948 | 5056 | 1 | B | Introduction of the FDD L-band (Band 74) into 36.133 | 15.0.0 |
| 2017/09 | RP-77 | RP-171946 | 5059 | | B | Introduction of Band 72 in TS36.133 | 15.0.0 |
| 2017/09 | RP-77 | RP-171952 | 5072 | | B | CR to 36.133: Introduction of Band 71 | 15.0.0 |
| 2017/09 | RP-77 | RP-171950 | 5074 | 1 | B | Introduction of Extended 1.5 GHz SDL bands 75 and 76 | 15.0.0 |
| 2017/09 | RP-77 | RP-171949 | 5136 | 1 | B | Introduction of TDD L-band into TS 36.133 | 15.0.0 |
| 2017-12 | RAN#78 | RP-172607 | 5162 | | A | Correction of test requirement for LAA Test cases A.8.26.x | 15.1.0 |
| 2017-12 | RAN#78 | RP-172593 | 5163 | 1 | B | Introduction of Band 73 into TS 36.133 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172580 | 5174 | | A | Introduction of NB-IoT RSTD measurement requirement | 15.1.0 |
| 2017-12 | RAN#78 | RP-172609 | 5175 | | A | Clarification on the SNR transition in NB-IoT RLM test for in-sync | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5192 | | A | cell identification test case for FeMTC in CEModeA with discontinuous MPDCCH monitoring | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5194 | | A | cell identification test case for FeMTC in CEModeA in DRX | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5196 | | A | cell identiciation test case for serving cell without gap for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172579 | 5197 | | A | RSRP accuracy test case for FeMTC in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5210 | | A | CR for MPDCCH RMCs for Category M2 UE RRM tests (R15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5212 | | A | CR for Rx-Tx time difference tests for UE category M1/M2 (R15) | 15.1.0 |

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| 2017-12 | RAN#78 | RP-172574 | 5214 | | A | CR for transmit timing accuracy tests for UE category M2 (R15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5222 | | A | CR for feMTC inter-frequency HO test cases CEModeA R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5224 | | A | CR for feMTC inter-frequency HO test cases CEModeB R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5226 | | A | CR for feMTC intra-frequency HO test cases CEModeA without SFN acquisition R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5228 | | A | CR for feMTC intra-frequency HO test cases CEModeB without SFN acquisition R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172581 | 5230 | | A | CR on measurement gap enhancement | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5231 | | A | CR on absolute RSRP accuracy for R15 non-BL/CE UE<br>(The CR was not implemented as it is replaced by CR 5472) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172607 | 5236 | 1 | A | Correction on coverage enhancement level for cat-M1 in IDLE state | 15.1.0 |
| 2017-12 | RAN#78 | RP-172607 | 5238 | 1 | A | Correction of cell reselection margin for Cat-M1 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172607 | 5240 | 1 | A | Removal of squarebrackets from the cat-M2 timing requirements | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5243 | 1 | A | Correction on coverage enhancement level for cat-M1 in IDLE state for Rel-15 MTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5246 | 1 | A | Correction to Rel-15 cat-M1 cell re-selection and RRC re-establishment test cases | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5250 | | A | FD-FDD Inter-freuency cell re-selection test for cat-M1 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5251 | | A | HD-FDD Inter-frequency cell re-selection test for cat-M1 UEs in normal coverage | 15.1.0 |
| 2017-12 | RAN#78 | RP-172579 | 5252 | | A | TDD-TDD Inter-freuency cell re-selection test for cat-M1 UEs in normal coverage | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5256 | | A | FD-FDD Inter-freuency RRC re-establishment est for cat-M1 UEs in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5257 | | A | HD-FDD Inter-freuency RRC re-establishment est for cat-M1 UEs in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172579 | 5258 | | A | TDD-TDD Inter-freuency RRC re-establishment est for cat-M1 UEs in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5265 | | A | E-UTRAN FD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5266 | | A | E-UTRAN HD-FDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5267 | | A | E-UTRAN TDD Early Out-of-sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5268 | | A | E-UTRAN FD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5269 | | A | E-UTRAN HD-FDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5270 | | A | E-UTRAN TDD Early In-Sync reporting Test for Cat-M1 UE in CEModeA | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5295 | 3 | B | Clarification of LTE requirements applicability for NSA NR | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5305 | 2 | B | CR on NR PSCell Addition and Release Delay | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5307 | | A | CR on 36.133 Intra and inter-frequency RSRP and RSRQ measurement accuracies for UE cat M1 CE Mode B | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5308 | | A | CR to Correct Pool Configuration and FRC for CBR test | 15.1.0 |
| 2017-12 | RAN#78 | RP-172607 | 5313 | | A | Correction of OCNG for LAA Test cases A.8.26.x, A.9.1.x, A.9.2.x | 15.1.0 |
| 2017-12 | RAN#78 | RP-172609 | 5318 | | A | Add 5MHz eCell Channel BW scenario in NB-IoT Random Access Test cases | 15.1.0 |
| 2017-12 | RAN#78 | RP-172609 | 5320 | | A | Add 5MHz eCell Channel BW scenario in NB-IoT Transmit Timing Accuracy Test case | 15.1.0 |
| 2017-12 | RAN#78 | RP-172609 | 5322 | | A | Add 5MHz eCell Channel BW scenario in NB-IoT RLM In-sync Test cases | 15.1.0 |
| 2017-12 | RAN#78 | RP-172609 | 5325 | | A | Clarification on the SNR transition in NB-IoT RLM test for out-of-sync | 15.1.0 |
| 2017-12 | RAN#78 | RP-172607 | 5328 | | A | Correction to Test Parameters for FS3 Channel Occupancy tests | 15.1.0 |
| 2017-12 | RAN#78 | RP-172586 | 5333 | | A | CR on V2X requirements for asynchronous SyncRef UE Selection / Reselection (Rel-15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5335 | 1 | B | CR on Clarification for MTTD and MTRD for shortened TTI | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5337 | | A | CR on requirement applicability for R15 non-BL/CE UE | 15.1.0 |

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| 2017-12 | RAN#78 | RP-172571 | 5339 | 2 | B | CR on TS36.133 on interruptions for NSA LTE NR EN-DC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5340 | 1 | B | Introduction of NR references, definitions and abbreviations in 36.133 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5341 | 1 | B | TX timing requirements for sTTI and reduced processing time | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5342 | | B | CGI interruption requirements for sTTI and processing time reduction | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5343 | | B | ProSe interruption requirements for sTTI and processing time reduction | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5344 | 1 | B | Transmit timing adjustment delay | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5345 | 1 | B | STTI definition for 36.133 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172594 | 5346 | | B | CR to 36.133: Introduction of Band 49 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5348 | | A | Clarification on UE synchronization behaviour during the evaluation of GNSS reliability | 15.1.0 |
| 2017-12 | RAN#78 | RP-172611 | 5358 | | A | RRM NB-IoT: Correction to transmit timing accuracy test under enhanced coverage (Rel-15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172613 | 5361 | | A | RRM 4DL: Correction of cell powers for TC A.9.2.46 (Rel-15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172608 | 5366 | | A | CR for RLM tests for non-BL/CE UE (R15) | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5367 | 1 | B | Introduction of MRTD/MTTD requirement for sTTI | 15.1.0 |
| 2017-12 | RAN#78 | RP-172608 | 5370 | 1 | A | Introducing PBCH repetition for eMTC RRM test case | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5378 | | A | Clarification on measurement reporting delay for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5380 | | A | Inter-freuency cell re-selection test for cat-M1 in enhanced coverage | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5382 | | B | Inter-freuency RRC re-establishment est for cat-M1 UEs in CEModeB | 15.1.0 |
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| 2017-12 | RAN#78 | RP-172576 | 5387 | | B | E-UTRAN HD-FDD Enhanced RLM Tests for Cat-M1 UE in CEModeB | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5388 | | B | E-UTRAN TDD Enhanced RLM Tests for Cat-M1 UE in CEModeB | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5390 | | A | CR on Autonomous Resource Selection/Reselection Measurement Tests for V2X R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172610 | 5393 | | A | Correctoin on cell reselectoin test case | 15.1.0 |
| 2017-12 | RAN#78 | RP-172610 | 5396 | | A | Correctoin on random access test case | 15.1.0 |
| 2017-12 | RAN#78 | RP-172610 | 5399 | | A | Correction on NPRACH configuration in RRC re-establishment test cases | 15.1.0 |
| 2017-12 | RAN#78 | RP-172580 | 5401 | | A | Test case for random access on non-anchor carrier | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5403 | | A | Update the maximum DRX cycle length in connected mode | 15.1.0 |
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| 2017-12 | RAN#78 | RP-172578 | 5433 | | A | HD-FDD cell identification test case for FeMTC in CEModeB with discontinuous MPDCCH monitoring R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172579 | 5434 | | A | TDD cell identification test case for FeMTC in CEModeB with discontinuous MPDCCH monitoring R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5435 | | A | FDD cell identification test case for FeMTC in CEModeB in DRX R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5436 | | A | HD-FDD cell identification test case for FeMTC in CEModeB in DRX R15 | 15.1.0 |
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| 2017-12 | RAN#78 | RP-172578 | 5438 | | A | FDD RSRP accuracy test case for FeMTC in CEModeB R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172578 | 5439 | | A | HD-FDD RSRP accuracy test case for FeMTC in CEModeB R15 | 15.1.0 |
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| 2017-12 | RAN#78 | RP-172585 | 5444 | | A | CR on E-CID for eNB-IOT normal coverage R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5445 | | A | CR on E-CID for eNB-IOT enhanced coverage R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172580 | 5448 | | A | CR for intra RSTD accuracy test case for eNB-IOT positioning in normal coverage R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172580 | 5449 | | A | CR for intra RSTD accuracy test case for eNB-IOT positioning in enhanced coverage R15 | 15.1.0 |
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| 2017-12 | RAN#78 | RP-172580 | 5451 | | A | CR for inter RSTD accuracy test case for eNB-IOT positioning in enhanced coverage R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172585 | 5452 | | A | CR on NB-IOT RSTD requirement R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5455 | | A | CR on HD-FDD requirement for FeMTC R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5456 | | B | CR on sTTI related definitions | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5458 | 1 | B | CR on SCell activation and deactivation for sTTI and Spt | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5459 | 1 | B | CR on Measurement reporting delay for shorten TTI and reduced processing time | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5460 | | B | Power headroom with shorten TTI and reduced processing time | 15.1.0 |
| 2017-12 | RAN#78 | RP-172587 | 5461 | | B | CR on DRX state for sTTI | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5463 | 2 | B | CR for TS36.133 on inter-RAT measurement requirement for NR | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5467 | 1 | B | CR on measurement gap patterns in TS 36.133 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5468 | 3 | B | CR on event triggering and reporting criteria for NR | 15.1.0 |
| 2017-12 | RAN#78 | RP-172580 | 5470 | | A | Correction of placement of NRSRQ mapping table | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5472 | | A | CR on introduction of measurement requirements for non-BL CE UE | 15.1.0 |
| 2017-12 | RAN#78 | RP-172575 | 5474 | | A | CR on introduction of remaining measurement requirements for non-BL CE UE in CE Mode B | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5475 | 3 | B | Introduction of requirement on EN-DC SSTD measurements | 15.1.0 |
| 2017-12 | RAN#78 | RP-172574 | 5477 | | A | Applicability of FeMTC RRM Test Cases | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5478 | 1 | B | E-UTRA Inter-frequency Measurement Requirements for NSA Operation | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5479 | 1 | B | LTE and NR cell naming convention in 36.133 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5480 | 1 | B | CR for 36.133 on Number of carriers being monitored | 15.1.0 |
| 2017-12 | RAN#78 | RP-172571 | 5483 | 2 | B | Endorsed CR on NR PSCell Addition and Release Delay with modifications | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5496 | | A | E-UTRAN FD-FDD intra-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5497 | | A | E-UTRAN HD-FDD intra-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5498 | | A | E-UTRAN TDD intra-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5499 | | A | E-UTRAN FD-FDD intra-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5500 | | A | E-UTRAN HD-FDD intra-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5501 | | A | E-UTRAN TDD intra-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5502 | | A | E-UTRAN FD-FDD inter-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5503 | | A | E-UTRAN HD-FDD inter-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5504 | | A | E-UTRAN TDD inter-frequency RSTD measurement period for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172576 | 5505 | | A | E-UTRAN FD-FDD inter-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5506 | | A | E-UTRAN HD-FDD inter-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172577 | 5507 | | A | E-UTRAN TDD inter-frequency RSTD measurement accuracy for FeMTC | 15.1.0 |
| 2017-12 | RAN#78 | RP-172579 | 5510 | 1 | A | Reference correction | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5514 | | A | CR on inter frequency measurement requirement R15 | 15.1.0 |
| 2017-12 | RAN#78 | RP-172583 | 5516 | | A | CR on UE Rx-Tx measurement requirement R15 | 15.1.0 |
| 2018-03 | RAN#79 | RP-180264 | 5518 | 4 | F | CR on TS36.133 on interruptions for NSA EN-DC | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5521 | 2 | F | Number of carriers | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5524 | 1 | F | Editorial corrections for NSA NR | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5526 | 1 | F | CR on NR PSCell addition and release delay | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5528 | | A | Remove [ ] from UE Cat 1bis RRM requirements (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180291 | 5530 | | A | Correction of test requirement for LAA Test cases A.8.26.x | 15.2.0 |
| 2018-03 | RAN#79 | RP-180293 | 5536 | | A | Correction to Reference NPRACH Configurations | 15.2.0 |
| 2018-03 | RAN#79 | RP-180293 | 5539 | | A | Finalising NB-IoT NPRACH Test cases A.6.2.16 and A.6.2.17 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180293 | 5542 | | A | Correction to NB-IoT UE Transmit Timing Accuracy Test cases | 15.2.0 |
| 2018-03 | RAN#79 | RP-180291 | 5545 | 1 | A | Correction to successful report rate threshold for FS3 channel occupancy tests | 15.2.0 |

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| 2018-03 | RAN#79 | RP-180291 | 5548 | | A | Correction to incorrect reference for A8.26.9 and A8.26.10 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180291 | 5551 | | A | Correction to OCNG pattern for FS3 RSSI and channel occupancy tests | 15.2.0 |
| 2018-03 | RAN#79 | RP-180297 | 5553 | 1 | A | CR for applibility correction for non-BLCE UE R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180299 | 5555 | | A | Correction of test requirements for RSTD intra-frequency reporting delay for Cat1Bis (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180299 | 5557 | | A | Correction of test requirements for RSTD inter-frequency reporting delay for Cat1Bis (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180299 | 5559 | | A | Correction of test requirements for RSTD measurement performance for Cat1Bis (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180299 | 5561 | | A | RRM-Cat1Bis: Missing references to the core requirements (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5563 | | A | Corrections on enhanced RLM tests in CEModeA (R15)<br>The CR was partially implemented as it was not based on the latest version of the spec | 15.2.0 |
| 2018-03 | RAN#79 | RP-180281 | 5566 | | A | Correction for LAA channel occupancy test (R15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180294 | 5569 | | A | Correction for LAA RSSI measurement accuracy requirement (R15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5571 | 1 | F | Requirements for LTE incmon with NR | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5573 | | A | Changes to conditions for V2X GNSS reliability requirements | 15.2.0 |
| 2018-03 | RAN#79 | RP-180279 | 5575 | | B | CR to 36.133: Introduction of Band 85 (B12-extended) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180297 | 5577 | | A | Updating HO requirement without SFN acquisition for feMTC R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5579 | | A | Updating HO test cases without SFN acquisition for feMTC CEModeA R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5581 | | A | Updating HO test cases without SFN acquisition for feMTC CEModeB R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5582 | 1 | F | Interruption time for MG in EN-DC | 15.2.0 |
| 2018-03 | RAN#79 | RP-180297 | 5591 | | A | CR on RRM measurement requirements for UE cat M1 R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5593 | 1 | A | CR on intra RSTD accuracy requirement for FeMTC R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180295 | 5595 | 1 | A | CR on non-uniform gap inter frequency requirements when DRX is used R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5596 | | F | CR on TS36133 for event triggering and reporting criteria | 15.2.0 |
| 2018-03 | RAN#79 | RP-180295 | 5598 | | A | Correction on interruption test cases for SRS switching in CA R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180295 | 5600 | | A | Correction on interruption test cases for SRS switching in DC R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5601 | | F | CR on measurement gap patterns in TS 36.133 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180295 | 5603 | 1 | A | Clean-up for high speed performance enhancement | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5605 | | A | CR on introducing PSSCH RMC configuration for V2X UE autonomous resource selection/reselection measurement tests R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180293 | 5613 | | A | Editorial change on RLM requirement | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5618 | | A | CR for intra frequency RSTD reporting delay test case for eNB-IOT positioning R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5619 | | A | CR for inter frequency RSTD reporting delay test case for eNB-IOT positioning R15 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5622 | 1 | B | CR on TS36.133 for UE capability in idle mode | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5624 | | F | CR on TS36.133 for NR RRM measurement in EN-DC | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5625 | 1 | F | CR on TS36.133 for inter-frequency E-UTRAN RRM measurement in EN-DC | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5628 | 2 | B | CR on TS36.133 for inter-RAT handover from E-UTRAN to NR | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5631 | 1 | F | CR on TS36.133 for UE measurement capability related to EN-DC operation | 15.2.0 |
| 2018-03 | RAN#79 | RP-180264 | 5632 | 1 | F | CR on TS36.133 for EN-DC SSTD measurement | 15.2.0 |
| 2018-03 | RAN#79 | RP-180294 | 5642 | | A | CR for 36.133 introducing band 68 | 15.2.0 |
| 2018-03 | RAN#79 | RP-180293 | 5645 | | A | Clarification on coverage enhancement level for cat-NB1 in IDLE state | 15.2.0 |
| 2018-03 | RAN#79 | RP-180297 | 5647 | | A | Clarification on enhanced RLM requirements for FeMTC | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5649 | 1 | A | Editorial correction to test cases on SI reading test in DRX for cat-M1 in CEModeB | 15.2.0 |
| 2018-03 | RAN#79 | RP-180296 | 5656 | | A | Editorial correction in RSTD requirements for UE category 1bis | 15.2.0 |

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| 2018-03 | RAN#79 | RP-180296 | 5658 | | A | OTDOA NB-IoT: Corrections to core and test requirements for NB-IOT Positioning tests (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180298 | 5660 | | A | OTDOA eMTC: Corrections to core and test requirements for eMTC Positioning tests (Rel-15) | 15.2.0 |
| 2018-03 | RAN#79 | RP-180278 | 5661 | | B | Introduction of TDD 3.3-3.4GHz band (band 52) | 15.2.0 |
| 2018-06 | RAN#80 | RP-181075 | 5687 | | B | CR for 36.133 on UE measurement capability for NR SA UE without NR PCell | 15.3.0 |
| 2018-06 | RAN#80 | RP-181075 | 5782 | | B | On TDD inter-RAT SFTD measurement requirements | 15.3.0 |
| 2018-06 | RAN#80 | RP-181075 | 5831 | 1 | B | CR for 36.133 Clarification on the total number of carrier frequency layers | 15.3.0 |
| 2018-06 | RAN#80 | RP-181075 | 5735 | 4 | B | Introduction of inter-RAT SFTD measurement requirement | 15.3.0 |
| 2018-06 | RAN#80 | RP-181075 | 5783 | 1 | B | On inter-RAT SFTD interruption requirements | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5719 | | F | CR on TS36.133 for NR RRM measurement in EN-DC | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5666 | 1 | F | Applicability of EN-DC requirements in 36.133 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5761 | | F | CR on short gap for LTE measurement in TS36.133 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5790 | | F | CR on inter-frequency measurement in EN-DC for 36.133 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5800 | 1 | F | CR on TS36.133 for NR PSCell addition delay | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5799 | 2 | F | CR on TS36.133 for inter-RAT 3G measurement in EN-DC | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5759 | 2 | F | CR on TS36.133 on interruptions for NSA EN-DC | 15.3.0 |
| 2018-06 | RAN#80 | RP-181076 | 5760 | 2 | F | CR on TS36.133 for inter-RAT handover from E-UTRAN to NR | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5772 | 1 | F | CR on interruption for SCell activation and deactivation with sTTI | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5757 | 1 | D | Editorial corrections to STTI and short processing time requirements | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5758 | 2 | B | ONCG and RMC definitions for slot and subslot RRM testing in LTE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5791 | 2 | B | Test case principle for sTTI | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5792 | 2 | B | E-UTRAN FDD – UE Timing Advance Adjustment Delay Test for sTTI and processing time reduction | 15.3.0 |
| 2018-06 | RAN#80 | RP-181077 | 5833 | | B | E-UTRAN TDD – UE Timing Advance Adjustment Delay Test for sTTI and processing time reduction | 15.3.0 |
| 2018-06 | RAN#80 | RP-181079 | 5665 | 1 | B | CR on interruption and addition/release requirement for V2X carrier aggregation | 15.3.0 |
| 2018-06 | RAN#80 | RP-181079 | 5788 | 2 | B | CR on Synchronization Reference Source Selection/Reselection requirements for V2X CA | 15.3.0 |
| 2018-06 | RAN#80 | RP-181079 | 5769 | 2 | F | CR on V2X CA requirements corrections | 15.3.0 |
| 2018-06 | RAN#80 | RP-181082 | 5817 | 3 | B | Introducing RRC_INACTIVE mode mobility requirements for 36133 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5754 | | B | RSTD measurement requirements with new gaps | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5826 | | B | Introduction of High-velocity support for muting for Rel-15 MTC | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5803 | 1 | F | CR on CGI requirements for CEmodeB | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5805 | 1 | F | CR on new gap impact on intra-frequency RSTD requirements for M1 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5806 | 1 | F | CR on new gap impact on intra-frequency RSTD requirements for M2 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5753 | 2 | B | Introduction of measurement gaps for dense PRS | 15.3.0 |
| 2018-06 | RAN#80 | RP-181083 | 5825 | 3 | B | Introduction of CRS muting requirements for Rel-15 MTC | 15.3.0 |
| 2018-06 | RAN#80 | RP-181084 | 5717 | 1 | B | CR for relaxed monitoring of cell reselection | 15.3.0 |
| 2018-06 | RAN#80 | RP-181084 | 5796 | | B | CR for TDD NB-IoT RRM requirement | 15.3.0 |
| 2018-06 | RAN#80 | RP-181084 | 5827 | | B | Side conditions for supporting TDD NB-IOT | 15.3.0 |
| 2018-06 | RAN#80 | RP-181084 | 5797 | 1 | B | CR for serving cell measurement relaxation for WUS-capable UE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181085 | 5765 | 4 | B | Introduction of network-based CRS interference mitigation | 15.3.0 |
| 2018-06 | RAN#80 | RP-181093 | 5736 | | B | Introduction of 1UL and more than 5DL CA into 36.133 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181100 | 5756 | 1 | F | Introduction of generic duplex modes test cases for 3/4/5DL CA | 15.3.0 |
| 2018-06 | RAN#80 | RP-181100 | 5762 | 1 | F | Introduction of generic duplex modes test cases on RSRP and RSRQ accuracy for 3/4/5DL CA | 15.3.0 |
| 2018-06 | RAN#80 | RP-181100 | 5743 | 1 | F | New generic TC: 4DL CA Activation and Deactivation | 15.3.0 |
| 2018-06 | RAN#80 | RP-181100 | 5744 | 1 | F | New generic TC: 5DL CA Activation and Deactivation | 15.3.0 |
| 2018-06 | RAN#80 | RP-181100 | 5742 | 2 | F | New generic TC: 3DL CA Activation and Deactivation | 15.3.0 |
| 2018-06 | RAN#80 | RP-181110 | 5673 | | A | Correction of test parameters for LAA Test cases A.9.1.60 and A.9.1.61 | 15.3.0 |

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| 2018-06 | RAN#80 | RP-181110 | 5679 | | A | Specify Measurement BW for LAA Test cases A.8.26.3/4 and A.8.26.9/10 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181110 | 5750 | | A | Correction to Test Parameters for FS3 Channel Occupancy tests | 15.3.0 |
| 2018-06 | RAN#80 | RP-181111 | 5775 | | A | Correction to eMTC CGI reading delay requirement R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181112 | 5670 | | A | Remove [ ] from Physical channels for NB-IoT Test case A.6.1.16 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181112 | 5676 | | A | Update parameters for NB-IoT Tx Timing Test case A.7.1.18 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181112 | 5778 | | A | Correction to the delay requirement for RRC connection redirection to non-anchor carrier for NB-IoT R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181113 | 5664 | | A | Editorial changes to single carrier RLM test case for 4 Rx capable Ues R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181113 | 5747 | | A | Corrections to CA activation and deactivation test cases (Rel-15) | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5691 | | A | Intra-frequency RSTD measurement period requirements with gaps for Cat M1 UE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5693 | | A | Intra-frequency RSTD measurement period requirements with gaps for Cat M2 UE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5695 | | A | Correction for intra-frequency RSTD accuracy requirements with gaps for Cat M1 UE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5697 | | A | Correction for intra-frequency RSTD accuracy requirements with gaps for Cat M2 UE | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5709 | 1 | A | CR on intra-frequency RSTD measurement requirements for UE cat M1 in CE mode B | 15.3.0 |
| 2018-06 | RAN#80 | RP-181114 | 5711 | 1 | A | CR on intra-frequency RSTD measurement requirements for UE cat M2 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181115 | 5725 | | A | OTDOA NB-IoT: Corrections to test requirements for NB-IOT Positioning tests (Rel-15) | 15.3.0 |
| 2018-06 | RAN#80 | RP-181115 | 5699 | 1 | A | Correction in SRS switching requirements | 15.3.0 |
| 2018-06 | RAN#80 | RP-181115 | 5752 | | A | Remaining square brackets in eNB-IoT RSTD requirements (Rel-15) | 15.3.0 |
| 2018-06 | RAN#80 | RP-181115 | 5787 | | A | CR on modification of GNSS reliability requirements for V2X R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181115 | 5795 | | A | CR on NB-IoT test case Random Access on Non-anchor Carrier (A.6.2.18) R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181116 | 5768 | 1 | A | Correction to Category 1bis test case and requirement R15 | 15.3.0 |
| 2018-06 | RAN#80 | RP-181116 | 5785 | 1 | A | CR on modification of interruption requirement for V2V R15 | 15.3.0 |
| 2018-09 | RAN#81 | RP-181897 | 5840 | | F | Number of frequency layers for inter-frequency RSTD in NSA NR in 36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5843 | | F | Correcting inactive state requirements in 36133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5842 | 1 | F | Correcting UE measurement capability with same MO configured by MN and SN on TS36.133<br>(The CR was not implemented as it is replaced by CR 5897r1) | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5837 | 2 | F | CR 36.133 Correction of EN-DC SFTD core requirement in DRX | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5835 | 1 | F | Interuption requirements for EN-DC in 36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5841 | 2 | F | CR on inter-RAT NR measurements iin idle in 36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5848 | 2 | B | Interruption Requirements on LTE Serving Cells due to BWP Switching | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5856 | | F | Interuption requirements for EN-DC in 36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5866 | | F | CR to TS36.133 for editorial correction of NR NSA measurement capability | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5868 | | F | Introduction on Gap sharing for EN-DC in TS36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5886 | | F | Correction of EN-DC SFTD core requirement | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5885 | 1 | F | Clarification of inter-RAT SFTD core requirement | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5897 | 1 | F | Correcting UE measurement capability with same MO configured by MN and SN on TS36.133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5940 | 2 | F | CR on NR PScell addition | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5857 | 1 | F | CR on TS36.133 for handover from E-UTRAN to NR | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5909 | 1 | B | CR to 36.133 on introduction of SFTD measurement accuracy requirements | 15.4.0 |
| 2018-09 | RAN#81 | RP-181897 | 5867 | 3 | F | CR on TS36.133 for inter-RAT NR measurements in idle | 15.4.0 |
| 2018-09 | RAN#81 | RP-181899 | 5913 | | F | Indicator for high-speed operation for Rel-15 cat-M1/M2 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181899 | 5879 | 1 | B | Clarification of the requirement for dense PRS gap in eFeMTC UE R15 | 15.4.0 |

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| 2018-09 | RAN#81 | RP-181899 | 5891 | 1 | F | CR on RLM requirements for UE configured with dense PRS gaps | 15.4.0 |
| 2018-09 | RAN#81 | RP-181899 | 5936 | 1 | F | Updated requirements for measurement gaps for dense PRS | 15.4.0 |
| 2018-09 | RAN#81 | RP-181899 | 5916 | 1 | F | Remaining work on CRS muting for Cat-M1/M2 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181900 | 5930 | 1 | B | Addition of NSSS-based RRM measurement accuracy requirement | 15.4.0 |
| 2018-09 | RAN#81 | RP-181900 | 5892 | 1 | F | CR on WUS RRM requirements | 15.4.0 |
| 2018-09 | RAN#81 | RP-181903 | 5858 | 1 | F | CR on Interruption and Delay of CC addition/release | 15.4.0 |
| 2018-09 | RAN#81 | RP-181904 | 5895 | | F | Correcting UE measurement capability in Inactive state for 36133 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181905 | 5876 | 1 | B | Addition of Scell activation/interruption requiremetn for dormant SCell | 15.4.0 |
| 2018-09 | RAN#81 | RP-181905 | 5944 | 2 | B | CR introducing enhanced utilization of CA and direct activation | 15.4.0 |
| 2018-09 | RAN#81 | RP-181905 | 5942 | 2 | B | CR introducing enhanced utilization of CA and idle mode measurements for early reporting | 15.4.0 |
| 2018-09 | RAN#81 | RP-181906 | 5931 | 1 | F | Applicability requirement for network-based CRS-IM | 15.4.0 |
| 2018-09 | RAN#81 | RP-181911 | 5861 | | A | Correction of test parameters for LAA Test cases A.9.1.60 and A.9.1.61 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181911 | 5872 | | A | Clarification of the measurement gap offset in LAA inter-frequency measurement test R15 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181912 | 5917 | | A | Correcton to category M1 PDSCH RMCs | 15.4.0 |
| 2018-09 | RAN#81 | RP-181913 | 5914 | | A | Correction on gap ID usage for UE category M1/M2 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181913 | 5935 | | A | Correction in inter-frequency RSTD measurement period requirements in FeMTC | 15.4.0 |
| 2018-09 | RAN#81 | RP-181914 | 5901 | | A | CR on modification of V2X initiation/cease of SLSS transmission test for eNB as Timing Reference R15 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181914 | 5903 | | A | CR on modification of V2X initiation/cease of SLSS transmission test for SyncRef UE as Timing Reference R15 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181914 | 5905 | | A | CR on modification of V2X congestion control measurement test R15 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181915 | 5853 | | A | Corrections to NB-IoT RSTD test cases (Rel-15) | 15.4.0 |
| 2018-09 | RAN#81 | RP-181915 | 5855 | | A | Correct 5MHz eCell PRB# for Cat NB1 Test Case A.4.2.18 | 15.4.0 |
| 2018-09 | RAN#81 | RP-181915 | 5874 | | A | Introduction of MSG3-based channel quality report for NB-IoT | 15.4.0 |
| 2018-09 | RAN#81 | RP-181917 | 5925 | | B | Introduction of Event Triggered Reporting test cases with generic duplex modes for 6DL/7DL CA | 15.4.0 |
| 2018-09 | RAN#81 | RP-181917 | 5926 | | B | Introduction of Activation and Deactivation test cases with generic duplex modes for 6DL/7DL CA | 15.4.0 |
| 2018-09 | RAN#81 | RP-181917 | 5927 | | B | Introduction of generic duplex modes test cases on RSRP accuracy for 6DL/7DL CA | 15.4.0 |
| 2018-09 | RAN#81 | RP-181917 | 5928 | | B | Introduction of generic duplex modes test cases on RSRQ accuracy for 6DL/7DL CA | 15.4.0 |
| 2018-09 | RAN#81 | RP-181917 | 5851 | 1 | F | Corrections to generic CA RRM test cases (Rel-15) | 15.4.0 |
| 2018-12 | RAN#82 | RP-182360 | 5946 | | F | Interuption requirements correction for EN-DC in 36.133 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 5948 | | F | CR on UE measurement capability with MOs configured by MN and SN in TS36.133 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 5954 | | A | Finalize MSG3-based channel quality report for NB-IoT | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 5955 | 1 | B | RMC for NB-IoT TDD RRM test cases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5956 | 1 | F | Addition of side condition for CGI reading delay for Rel-15 eFeMTC UE | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5959 | 1 | F | Applicability rules for UE supporting new gaps | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5960 | 2 | B | Intra-frequency FDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5961 | 1 | B | Intra-frequency HD-FDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5962 | 1 | B | Intra-frequency TDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5964 | 1 | B | Inter-frequency HD-FDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5965 | 1 | B | Inter-frequency TDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182383 | 5967 | 1 | A | Correction in RSTD measurement requirements | 15.5.0 |

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| 2018-12 | RAN#82 | RP-182360 | 5968 | 2 | F | CR to 36.133 on SFTD measurement requirements (Section 8.17.2, 8.1.2.4.25) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 5983 | 3 | F | Requirements for high velocity measurement for efeMTC | 15.5.0 |
| 2018-12 | RAN#82 | RP-182361 | 5987 | | F | CR on interruption during DRX operation in TS 36.133 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182383 | 6001 | | A | Correction to inter-frequency handover test case for UE category M1/M2 in CEModeB | 15.5.0 |
| 2018-12 | RAN#82 | RP-182361 | 6017 | 1 | F | CR 36.133 Inter-RAT and EN-DC SFTD measurement accuracy for FR2 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182379 | 6024 | | A | CR 36.133 Correction of references in OCNG patterns Rel-15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6026 | | A | CR 36.133 Correction of NB-IoT OCNG patterns Rel-15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6027 | 1 | B | Introduction of OCNG patterns for NB-IoT TDD | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6028 | 1 | F | UE known dormant SCell condition and activation delay requirements for unknown dormant SCell | 15.5.0 |
| 2018-12 | RAN#82 | RP-182384 | 6030 | | A | Correction to downlink channel quality reporting R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182371 | 6032 | 1 | B | RRM test for dormant SCell | 15.5.0 |
| 2018-12 | RAN#82 | RP-182384 | 6035 | | A | Correction to RSTD measurement accuracy requirement in NB-IoT R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182362 | 6038 | 4 | B | CR for 36.133 on E-UTRAN measurement to support gap pattern 4, 6,7,8,10 (section 8.1.2.1, 8.1.2.3.1.2, 8.1.2.3.2.2, 8.17.3) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6039 | | B | Inter-frequency FDD test cases for RSTD measurement period under new measurement gaps for CE Mode A | 15.5.0 |
| 2018-12 | RAN#82 | RP-182361 | 6040 | | F | CR for correction on measurement gap sharing in EN-DC | 15.5.0 |
| 2018-12 | RAN#82 | RP-182381 | 6043 | | A | Correction to FDD-FS3 Intra-frequency event triggered reporting in DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182388 | 6044 | | F | Correction to DL CA Activation and Deactivation Test cases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182384 | 6051 | 1 | A | NB-IoT RSTD accuracy tests using Type 2 NPRS - Rel15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6052 | 2 | F | CR on updating requirement for BWP switching interruption in TS36.133 (Section 7.32.2.7) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182382 | 6058 | | A | Corrections to feMTC RRM test case A.8.1.28 (Rel-15) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182388 | 6061 | | F | Corrections to generic CA RRM test cases up to 5 DL CCs (Rel-15) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182388 | 6062 | | F | Corrections to generic CA RRM test cases for 6 and 7 DL CCs (Rel-15) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6065 | | B | Introducing TDD NPRACH configuration for NB test cases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6066 | 1 | B | TDD contention based random access test case under normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6067 | 1 | B | TDD contention based random access test case under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6068 | 1 | B | TDD contention based random access test case on non-anchor carriers | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6069 | 1 | B | TDD intra-frequency RSTD measurement accuracy test case under normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6070 | 1 | B | TDD inter-frequency RSTD measurement accuracy test case under normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6071 | 1 | B | TDD intra-frequency RSTD measurement accuracy test case under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6072 | 1 | B | TDD inter-frequency RSTD measurement accuracy test case under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6073 | 2 | B | TDD idle intra-frequency RSTD measurement test case under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6074 | 2 | B | TDD idle inter-frequency RSTD measurement test case under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6075 | | F | CR on TDD support in conditions for NB-IoT measurements | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6076 | 2 | F | CR on TDD support in measurement accuracy requirements for NB-IoT | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6079 | 1 | A | CR on NRSRP accuracy applicability for UE Category NB1 and NB2 R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6087 | | A | CR on NB random access test cases R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182370 | 6089 | 1 | B | Introducing principle for LTE UE connected to 5GC test cases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182361 | 6092 | 1 | F | CR on PSCell addition delay in TS36.133 | 15.5.0 |

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| | | | | | | (The CR was not implemented as it is not based on the latest version of the specification) | |
| 2018-12 | RAN#82 | RP-182361 | 6093 | | F | Defining MG starting point in 36.133 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6095 | | A | Introduction of MSG3-based channel quality reporting test | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6097 | 1 | B | CR introducing out-of-sync RLM test for NB-IoT TDD in normal coverage with DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6098 | 1 | B | CR introducing out-of-sync RLM test for NB-IoT TDD in enhanced coverage with DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6099 | 1 | B | CR introducing in-sync RLM test for NB-IoT TDD in normal coverage with DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6100 | 1 | B | CR introducing in-sync RLM test for NB-IoT TDD in enhanced coverage with DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6101 | 1 | B | CR introducing in-sync RLM test for NB-IoT TDD in normal coverage without DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6102 | 1 | B | CR introducing in-sync RLM test for NB-IoT TDD in enhanced coverage without DRX | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6103 | 1 | B | CR introducing Out-of-sync RLM test for NB-IoT TDD in normal coverage without DRX in stand alone mode | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6104 | 1 | B | CR introducing Out-of-sync RLM test for NB-IoT TDD in enhanced coverage without DRX in guard band | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6105 | 1 | F | UE known dormant SCell condition | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6108 | 1 | F | Introducing enhanced utilization of CA and direct activation in HO | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6113 | 1 | B | Cell re-selection test case for TDD Intra frequency case for UE category NB1 in in-band mode in normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6114 | 1 | B | TDD Inter-frequency RRC Re-establishment for UE category NB1 in In-Band mode under normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6115 | 1 | B | UE Transmit Timing Accuracy Test for category NB1 UE In-Band in Normal coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6118 | 1 | B | UE Transmit Timing Accuracy Test for category NB1 UE In-Band in Enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182367 | 6119 | 1 | B | UE Timing advance adjustment test Test for category NB1 UE standalone under Enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6120 | 1 | B | TDD Intra-frequency RRC Re-establishment for UE category NB1 in In-Band mode under enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6121 | 1 | B | Cell re-selection test case for TDD Inter- frequency case for UE category NB1 in in-band mode in enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6122 | 1 | B | Cell re-selection test case for TDD Intra frequency case for UE category NB1 in in-band mode in enhanced coverage | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6124 | 2 | F | Correction of references in CONNECTED mode requirements for category M1 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6127 | 1 | B | Introduction of enhanced PHR for category NB1 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182366 | 6128 | | B | Remaining work on minimum WUS reception requirements for NB-IoT | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6129 | | B | Introduction of WUS requirements for efeMTC | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6132 | 1 | F | Addition of missing Band 71 in 36.133 NB-IoT bands | 15.5.0 |
| 2018-12 | RAN#82 | RP-182385 | 6134 | | A | Corrections on V2X core requirements in TS36.133 R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182385 | 6136 | | A | Corrections on Conditions for Selection/Reselection to Intra-frequency SyncRef UE R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182382 | 6149 | | A | Clarification on the applicability of side condition for CE UE R15 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182383 | 6153 | | A | Applicability of non-BL CE requriements for Cat-1bis (The CR was partially implemented as it is not based on the latest version of the specification) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6155 | 1 | F | Correction to CRS muting applicability in efeMTC | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6156 | 1 | F | Introduction of search window for 4ms MGL in LTE interfrequency requirements (The CR was partially implemented as this CR is clashes with CR#6038r4) | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6157 | 2 | F | Corrections to DRX cycle for EN-DC operation | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6158 | 2 | F | Correction of side condition in FR2 handover in section 6.1.1 | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6160 | 2 | F | SIB5 reporting corrections for Idle Mode CA Measurement | 15.5.0 |
| 2018-12 | RAN#82 | RP-182386 | 6167 | 1 | F | Corrections in network-based CRS interference mitigation requirements | 15.5.0 |

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| 2018-12 | RAN#82 | RP-182365 | 6168 | 2 | B | Intra-frequency FDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6169 | 2 | B | Intra-frequency HD-FDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6170 | 2 | B | Intra-frequency TDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6171 | 1 | B | Inter-frequency FDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6172 | 1 | B | Inter-frequency HD-FDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182365 | 6173 | 2 | B | Inter-frequency TDD test cases for RSTD measurement period under new measurement gaps for CE Mode B | 15.5.0 |
| 2018-12 | RAN#82 | RP-182383 | 6175 | | A | Correction in FeMTC RSTD test cases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182362 | 6176 | | B | Inter-RAT NR measurement accuracy requirements | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6177 | | F | Side conditions for inter-RAT NR measurements in EN-DC case | 15.5.0 |
| 2018-12 | RAN#82 | RP-182360 | 6178 | | F | Side conditions for inter-RAT NR measurements in non-EN-DC case | 15.5.0 |
| 2018-12 | RAN#82 | RP-182379 | 6186 | | A | Corrections to incmon testcases | 15.5.0 |
| 2018-12 | RAN#82 | RP-182369 | 6187 | | B | CR on introducing test cases of Synchronization Reference Source Selection/Reselection requirements for V2X CA | 15.5.0 |
| 2018-12 | RAN#82 | RP-182369 | 6188 | | B | CR on introducing test cases of interruptions due to V2X CA | 15.5.0 |
| 2018-12 | RAN#82 | RP-182377 | 6015 | | B | CR adding_B65 for NB1&NB2 | 16.0.0 |
| 2018-12 | RAN#82 | RP-182376 | 6096 | 1 | B | CR to 36.133: Introduction of Band 53 | 16.0.0 |
| 2019-03 | RAN#83 | RP-190414 | 6192 | | A | Correction to FDD-FS3 Intra-frequency event triggered reporting in DRX | 16.1.0 |
| 2019-03 | RAN#83 | RP-190413 | 6197 | | A | Clarifications on HD-FDD NB-IoT Out-of-sync RLM test cases | 16.1.0 |
| 2019-03 | RAN#83 | RP-190413 | 6201 | | A | Corrections to HD-FDD NB-IoT In-Sync RLM tests | 16.1.0 |
| 2019-03 | RAN#83 | RP-190413 | 6205 | | A | Clarification on test requirements for transmit timing accuracy for HD-FDD Category NB1 UE | 16.1.0 |
| 2019-03 | RAN#83 | RP-190406 | 6207 | | A | Clarification on test requirements for transmit timing accuracy for TDD Category NB1 UE | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6210 | | A | Clarifications to HD-FDD Idle State Positioning Measurement test for NB1 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190406 | 6212 | | A | Clarifications to TDD Idle State Positioning Measurement test for NB1 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6223 | | A | Corrections on SFTD R16 (8.1.2.4.26.1) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190411 | 6230 | | A | Correction to Incmon test cases for reselection from E-UTRA FDD/TDD to UTRA | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6234 | | A | Inter-RAT NR measurements in 36.133 for SA | 16.1.0 |
| 2019-03 | RAN#83 | RP-190413 | 6246 | 1 | A | CR on NB random access test cases R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6249 | 1 | A | CR on MSG3 based channel quality report requirements R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190406 | 6258 | | A | CR on Cat NB2 UE test cases applicability R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6260 | 1 | A | CR on BWP switch interruptions on LTE PCell in EN-DC R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190421 | 6262 | | A | Adding section 8.18 in 36.133 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190417 | 6265 | | A | Correction to the non-BL UE applicability | 16.1.0 |
| 2019-03 | RAN#83 | RP-190417 | 6268 | | A | Correction of reference number in Cat-M HO requirements | 16.1.0 |
| 2019-03 | RAN#83 | RP-190421 | 6270 | | A | Finalizing efeMTC CRS muting applicability | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6274 | | A | Measurement requirements for NE-DC | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6276 | | A | CR for measurement gap applicability for NE-DC | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6280 | | A | CR on E-UTRAN E-UTRAN inter-frequency and inter-RAT measurements with EN-DC in TS36.133 R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190402 | 6282 | | A | CR on corrections on SFTD measurements accuracy in TS36.133 R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6284 | | A | CR on gap sharing and CSSF definition in TS36.133 R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190408 | 6288 | | A | Applicability rule for 8Rx RLM R16 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6291 | | A | Correction of NB-IoT MSG3-based channel quality report test case | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6293 | | A | CR on E-UTRA SCell (de)activation interruptions for EN-DC (36.133, Rel-16) | 16.1.0 |

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| 2019-03 | RAN#83 | RP-190399 | 6295 | | A | CR on interruption requirements for NE-DC (36.133, Rel-16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6297 | | A | CR on E-UTRA SCell (de)activation applicability for NE-DC (36.133) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6304 | | A | Corrections to NB-IOT RSTD reporting delay core requirements (Rel-16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6307 | | A | Corrections to NB-IOT RSTD reporting accuracy test requirements for normal coverage (Rel-16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190416 | 6310 | | A | Corrections to NB-IOT RSTD reporting accuracy test requirements for enhanced coverage (Rel-16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190417 | 6316 | 1 | A | Correction to side conditions for cat-M | 16.1.0 |
| 2019-03 | RAN#83 | RP-190421 | 6320 | 1 | A | Maintenace CR on WUS requirements for cat-M Ues | 16.1.0 |
| 2019-03 | RAN#83 | RP-190420 | 6322 | 1 | A | Maintenace CR on WUS requirements for Rel-16 NB-IoT | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6324 | | A | Requirements for RRC connection release with redirection delay from LTE to NR | 16.1.0 |
| 2019-03 | RAN#83 | RP-190422 | 6326 | 1 | A | IDLE mode measurement requirements for euCA | 16.1.0 |
| 2019-03 | RAN#83 | RP-190407 | 6328 | 1 | A | Introduction of IDLE mode measurement accuracy requirements | 16.1.0 |
| 2019-03 | RAN#83 | RP-190407 | 6330 | 1 | A | CR introducing test case for enhanced utilization of CA and idle mode measurements for early reporting | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6333 | 1 | A | CR on inter-RAT NR measurements (36.133-rel16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6335 | 1 | A | CR on NR PSCell addition delay in EN-DC (36.133-rel16) | 16.1.0 |
| 2019-03 | RAN#83 | RP-190420 | 6337 | | A | Clean-up in network-based CRS interference mitigation requirements | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6343 | 1 | A | UE measurements capability in RRC_IDLE for EN-DC capable UE | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6345 | 1 | A | Introduction of NE-DC in 36.133 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6347 | 1 | A | Requirements for NGEN-DC | 16.1.0 |
| 2019-03 | RAN#83 | RP-190414 | 6348 | | A | CR to 36.133 for corrections on section A.9.10 and section A.9.13 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6349 | | A | Corrections on SFTD mesurement requirements for EN-DC | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6350 | | A | Corrections on SFTD accuracy requirements | 16.1.0 |
| 2019-03 | RAN#83 | RP-190399 | 6351 | 1 | A | CR for MO merging in 36.133 | 16.1.0 |
| 2019-03 | RAN#83 | RP-190400 | 6352 | | A | CR for SFTD in 36.133 | 16.1.0 |
| 2019-06 | RAN#84 | RP-191265 | 6360 | | A | Corrections to TDD in-sync RLM test cases for NB-IoT | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6362 | | A | Corrections to TDD inter-frequency idle state positioning measurement test in NB1 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6373 | | A | CR on Cat NB2 UE test cases applicability R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6379 | 1 | A | Maintenance on TDD inter-frequency re-establishment test cases R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6381 | | A | Maintenance on side conditions for NSSS measurement accuracy requirements R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6383 | | A | CR on TDD intra frequency idle RSTD accuracy test cases R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191266 | 6385 | | A | CR on serving cell measurement relaxation for NB-IoT R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6387 | | A | Maintenance CR on event triggering and reporting criteria R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6397 | | A | Introduction of UE measurement capability for NE-DC in 36.133 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6404 | | A | CR for starting point of measurement gap in LTE, ENDC and NEDC in TS 36.133 R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6410 | 1 | A | CR on PSCell addition delay R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6428 | | A | Interruption Requirement for RRC based BWP Switching on LTE Serving Cells | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6431 | 1 | A | CR on TS36.133 for UE behavior after MG (Section 8.1.2) | 16.2.0 |
| 2019-06 | RAN#84 | RP-191264 | 6438 | | A | Correction to side conditions for cat-M | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6443 | | A | Side condition for NR handover | 16.2.0 |
| 2019-06 | RAN#84 | RP-191267 | 6449 | | A | Correction to event triggered reporting on Deactivated SCell | 16.2.0 |
| 2019-06 | RAN#84 | RP-191258 | 6453 | | A | Correction to timing advance adjustment accuracy test for Cat-M1 UE | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6458 | | A | maintenance CR on redirection requirements R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6460 | | A | CR for NE-DC interruptions due to BWP switch R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191260 | 6465 | | A | Maintenance on HD-FDD inter-frequency re-establishment test cases R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191265 | 6467 | | A | CR on TDD inter frequency idle RSTD accuracy test cases R16 | 16.2.0 |

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| 2019-06 | RAN#84 | RP-191265 | 6469 | | A | endorsed CR for serving cell RRM measurement relaxation test case R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6475 | | A | Requirements for RRC connection release with redirection delay from LTE to NR | 16.2.0 |
| 2019-06 | RAN#84 | RP-191264 | 6478 | | A | CR introducing test cases for direct activation of Scell | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6480 | | A | PSCell addition delay in FR2 36.133 rel-16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191256 | 6481 | | B | Introduction of bands 87 and 88 into TS 36.133 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191264 | 6483 | | A | Corrections to idle mode CA measurement accuracy test | 16.2.0 |
| 2019-06 | RAN#84 | RP-191264 | 6485 | | A | Clarification on WUS EPRE in requirements for WUS reception for UE category M1 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6487 | | A | Correction CR for inter-RAT NR measurement before EN-DC in 36.133 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191260 | 6491 | | A | CR on threshold for FS3 RSSI and channel occupancy tests R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6493 | | A | CR on reselection criterion in inter-RAT NR measurements (36.133-rel16) | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6495 | 1 | A | CR to 36.133 on SFTD accuracy | 16.2.0 |
| 2019-06 | RAN#84 | RP-191238 | 6505 | | A | Correction on the Tiu in handover in TS36.133 R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191260 | 6512 | | A | Corrections on inter-frequency RS-SINR measurement accuracy test in TS36.133 R16 | 16.2.0 |
| 2019-06 | RAN#84 | RP-191261 | 6518 | | A | CR for eMTC re-establishment test case | 16.2.0 |
| 2019-06 | RAN#84 | RP-191261 | 6521 | | A | CR for eMTC RSTD test cases | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6532 | | A | CR 36.133 Correction to SFTD interruption requirements (Rel-16) | 16.2.0 |
| 2019-06 | RAN#84 | RP-191260 | 6536 | | A | Corrections to NB-IoT PRACH test cases (Rel-16) | 16.2.0 |
| 2019-06 | RAN#84 | RP-191267 | 6538 | | A | Adding missing bands in the bands grouping | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6540 | 1 | A | RSTD requirements for NE-DC | 16.2.0 |
| 2019-06 | RAN#84 | RP-191260 | 6543 | | A | Adding missing UE Rx-Tx time difference measurement mapping for TDD | 16.2.0 |
| 2019-06 | RAN#84 | RP-191239 | 6545 | 1 | A | Reporting criteria for NE-DC and EN-DC | 16.2.0 |
| 2019-09 | RAN#85 | RP-192052 | 6552 | | A | Correction to NB-IoT RSTD delay test case (Rel 16) | 16.3.0 |
| 2019-09 | RAN#85 | RP-192051 | 6562 | 1 | A | Corrections to test case for HD – FDD Inter frequency reselection case for UE Category NB1 In-Band mode in enhanced coverage | 16.3.0 |
| 2019-09 | RAN#85 | RP-192055 | 6565 | | A | CR on Cat NB2 UE test cases applicability R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192055 | 6567 | | A | maintenance CR on synchronized TDD NB test cases R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192055 | 6569 | | A | CR on NB1 timing test cases R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6577 | | A | CR on interruptions due to RRC based BWP switch for EN-DC R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6579 | | A | CR on BWP switch interruptions for NE-DC R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192052 | 6584 | | A | Clarification of Rmax for NB-IoT MSG3-based channel quality report | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6586 | | A | CR on applicability of gap in LTE, ENDC and NEDC in 36.133 R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6588 | | A | CR on default gap sharing scheme in 36.133 R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6590 | | A | CR on handover requirements in 36.133 R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6592 | | A | CR on PSCell addition in ENDC R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192041 | 6593 | 1 | B | CR on idle mode requirements in HST scenario | 16.3.0 |
| 2019-09 | RAN#85 | RP-192041 | 6594 | 1 | B | CR on Pcell measurement enhancement requirements in HST scenario | 16.3.0 |
| 2019-09 | RAN#85 | RP-192043 | 6598 | 1 | B | CR of adding LTE B42/B43 for UE category NB1/NB2 and CAT M1/M2 in R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192043 | 6599 | 1 | B | CR of adding LTE B7 for UE category NB1/NB2 in R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6601 | 1 | A | Editorial corrections in 36.133 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192055 | 6602 | 1 | F | Applicability of non-BL CE UE requirements in release 16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192052 | 6606 | | A | Correction of section numbering in handover requirements | 16.3.0 |
| 2019-09 | RAN#85 | RP-192055 | 6610 | | A | Clarification of normal and enhanced coverage UE requirements in IDLE mode for Rel-16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192041 | 6611 | 1 | B | UE Autonomous Timing Adjustment Requirement under High Speed Scenario | 16.3.0 |
| 2019-09 | RAN#85 | RP-192041 | 6616 | 1 | B | Measurement requirements for LTE further high speed enhancements | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6618 | 1 | A | Correction of interruption requirements for EN-DC in 36.133 R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6622 | 1 | A | Correction of interruption requirements for NE-DC in 36.133 R16 | 16.3.0 |
| 2019-09 | RAN#85 | RP-192047 | 6624 | 1 | A | Correction to MG interruption due to NE-DC in 36.133 R16 | 16.3.0 |

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| 2019-09 | RAN#85 | RP-192040 | 6625 | 1 | B | CR for Tx timing requirements for PUR transmission | 16.3.0 |
| 2019-09 | RAN#85 | RP-192040 | 6626 | | B | CR for relaxed serving cell monitoring for Rel-16 eMTC | 16.3.0 |
| 2019-12 | RAN#86 | RP-193043 | 6677 | | A | Correction to misused variables in intra-frequency cell identification requirements | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6680 | 1 | A | CR on handover 36.133 -R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193043 | 6685 | | A | CR on clarification on RSSI measurement requirement R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193006 | 6686 | 1 | B | CR to 36.133 on interruption requirements for NR V2X | 16.4.0 |
| 2019-12 | RAN#86 | RP-193026 | 6687 | 1 | B | CR: RRM test definition for Rel-16 HST | 16.4.0 |
| 2019-12 | RAN#86 | RP-193024 | 6688 | 2 | B | CR: RRM core requirement for 5G broadcast | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6691 | 1 | A | CR on E-UTRA Inter-frequency Measurements when Configured with E-UTRA-NR Dual Connectivity Operation in TS36.133 (section 8.17.3) | 16.4.0 |
| 2019-12 | RAN#86 | RP-193026 | 6695 | | F | Adding the IE flag in R16 HST | 16.4.0 |
| 2019-12 | RAN#86 | RP-193025 | 6696 | 2 | B | CR on RRM requirements for DAPS in femobility | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6701 | | A | Correction RAN4 requirements for a Dormant Scell | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6703 | | A | Measurements interruption requirements for an SCell in Dormant state | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6705 | | A | Correction to interruption requirement introduction to include dormant Scell | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6707 | | A | Removal of brackets from euCA performance requirements | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6709 | | A | Correction to test case A.8.16.104 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6711 | | A | Correction to S-measure threshold applicability in IDLE mode measurements | 16.4.0 |
| 2019-12 | RAN#86 | RP-193025 | 6712 | 1 | B | CR Introduction of handover delay requirements for conditional handover (section 5.1) | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6716 | | A | CR for 36133 editorial for section 7.6 and 7.31 in Rel-16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6717 | | A | Mirror CR for editorial changes for section 8.1.2.4.21 – 8.1.2.4.26 and 8.17.4 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193049 | 6724 | 1 | A | Correction of feMTC test cases | 16.4.0 |
| 2019-12 | RAN#86 | RP-193046 | 6726 | | A | Cat-1bis clarification to RSRQ measurements | 16.4.0 |
| 2019-12 | RAN#86 | RP-193046 | 6731 | | A | CR on maintaining core requirements and tests for V4X synchronization reference source selection/reselection R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193046 | 6734 | | A | CR on maintaining interruption tests due to V2X sidelink communication R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193024 | 6735 | 1 | B | CR on numerology switching delay and interruptions requirements with FeMBMS for LTE-based 5G broadcast | 16.4.0 |
| 2019-12 | RAN#86 | RP-193023 | 6744 | 1 | B | CR on serving cell measurement configured with WUS in Rel-16 NB IoT | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6746 | | A | Correction to direct Scell activation requirements R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6748 | | A | Correction to direct Scell activation during HO requirements R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6750 | | A | Adding interruption length requirements for direct Scell activation R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6752 | | A | Update to interruption requirements due to measurement on dormant Scell R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193047 | 6754 | | A | Adding interruption length requirements for dormant state transition R16 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6756 | | A | Correction on inter-frequency RSTD measurement requirements (cat-A) | 16.4.0 |
| 2019-12 | RAN#86 | RP-193008 | 6757 | | B | Introducing euCA related interruption requirements for EN-DC in 36.133 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193008 | 6758 | | B | Introducing euCA related interruption requirements for NE-DC in 36.133 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193026 | 6769 | | B | UE Autonomous Timing Adjustment Requirement under High Speed Scenario | 16.4.0 |
| 2019-12 | RAN#86 | RP-193043 | 6773 | | A | Clarifications on RSSI and Channel Occupancy measurement requirements in LTE LAA | 16.4.0 |
| 2019-12 | RAN#86 | RP-193023 | 6774 | | B | Connected mode channel quality report for UE category NB1 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193023 | 6775 | | B | MSG3-based channel quality report in non-anchor carrier for UE category NB1 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193023 | 6776 | | B | NB-IoT PUR transmit timing requirements | 16.4.0 |
| 2019-12 | RAN#86 | RP-193043 | 6781 | | A | Correction of reference in subclause 5.3.2 | 16.4.0 |
| 2019-12 | RAN#86 | RP-193038 | 6783 | | A | Editorial updates (36.133, section 8.19) | 16.4.0 |
| 2019-12 | RAN#86 | RP-193049 | 6791 | | A | Applicability of relaxed neighbour cell monitoring for category M1/M2 | 16.4.0 |

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| 2020-03 | RAN#87-e | RP-200413 | 6794 | 2 | F | CR on correction of measurement delay requirements for LTE HST in TS36.133 | 16.5.0 |
| 2020-03 | RAN#87-e | RP-200405 | 6795 | 2 | B | CR on logged MDT requirements (2, 4.3) | 16.5.0 |
| 2020-03 | RAN#87-e | RP-200413 | 6796 | | F | CR to TS 36.133: Finalization on RRM requirements for Rel-16 LTE HST | 16.5.0 |
| 2020-03 | RAN#87-e | RP-200418 | 6818 | | B | Introduction of Rel-16 WUS reception requirements for cat-M1/M2 | 16.5.0 |
| 2020-06 | RAN#88 | RP-200983 | 6826 | | A | [CR] RRC release with redirection 36.133 R16 Cat A | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6827 | 1 | B | CR to address NR-U in inter-RAT SFTD measurements in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6828 | 1 | B | CR to address NR-U in EN-DC SFTD measurements in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200990 | 6836 | | A | CR to RRM MPDSCH Repetitions in CE ModeA test case | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6837 | 2 | B | Introduction of addition and release of NR PSCell operating with CCA in EN-DC | 16.6.0 |
| 2020-06 | RAN#88 | RP-200975 | 6840 | 1 | B | 36.133 CR on cell identification in connected mode for | 16.6.0 |
| 2020-06 | RAN#88 | RP-201055 | 6842 | 1 | F | Finalisation of requirements in 36.133 R16 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200992 | 6844 | | A | Editorial correction of E-UTRAN FDD | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6846 | 1 | B | Updates to general section for NR-U in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200975 | 6848 | 2 | B | Cell re-selection for EUTRAN-NR high speed in TS36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200988 | 6851 | | A | CR on Number of carriers to monitor for IDLE mode measurements | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6854 | 1 | B | CR to TS 36.133: adding handover to NR-U | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6856 | 1 | B | Introduction of RLM requirements with enhanced MPDCCH | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6857 | 1 | B | Introduction of DL channel quality report for eMTC | 16.6.0 |
| 2020-06 | RAN#88 | RP-200990 | 6861 | | A | CR to TS 36.133: Change of SR-ConfigIndex in eMTC RLM DRX test cases (Rel-16) | 16.6.0 |
| 2020-06 | RAN#88 | RP-200983 | 6863 | | F | CR to 36.133 on NR reporting criteria | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6866 | | B | CR on downlink channel quality measurement requirement for Rel-16 NB IoT | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6867 | 1 | B | CR on non-anchor RRM measurement requirements in enhanced coverage for Rel-16 NB IoT | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6868 | 2 | B | CR on non-anchor RRM measurement requirements in normal coverage for Rel-16 NB IoT | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6869 | 2 | B | CR on measurement requriements for RSRP change based TA validation | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6870 | 1 | B | CR on updating RRM requirement for new introduced UE specific DRX cycles for Rel-16 NB-IoT | 16.6.0 |
| 2020-06 | RAN#88 | RP-200968 | 6874 | | A | CR on NB-IoT cell reselection margin in enhanced coverage in Rel-16 (Cat A) | 16.6.0 |
| 2020-06 | RAN#88 | RP-201045 | 6875 | 1 | B | CR on DL interruption on LTE carriers at Tx switching between two uplink carriers | 16.6.0 |
| 2020-06 | RAN#88 | RP-201047 | 6876 | 1 | B | CR on impact on LTE RRM measurement due to NR SRS carrier switching | 16.6.0 |
| 2020-06 | RAN#88 | RP-200963 | 6877 | 2 | F | CR on DAPS handover | 16.6.0 |
| 2020-06 | RAN#88 | RP-201047 | 6878 | 2 | B | CR on NR SRS carrier switching interruption in TS 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200983 | 6880 | | A | Correction on gap pattern applicability in TS 36.133 R16 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200983 | 6882 | | A | CR to remove RSTD requirements for NE-DC in 36.133 R16 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200966 | 6884 | | B | CR on interruption requirements for direct SCell activation for 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-201047 | 6885 | 1 | B | CR on Multiple SCell activation/deactivation interruption requirements 36133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-201047 | 6887 | | B | CR to 36.133 on CGI reading of LTE cell | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6888 | | B | CR on for quality reporting | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6889 | 1 | B | CR to add additional timing requirements for PUR | 16.6.0 |
| 2020-06 | RAN#88 | RP-200989 | 6893 | | A | Correction to eMTC inter-frequency reselection margin R16 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6894 | 1 | B | RSS based RSRP measurement to IDLE mode for eMTC in normal coverage | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6895 | 1 | B | RSS based RSRP measurement to IDLE mode for eMTC in enhanced coverage | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6896 | 1 | B | RSS based RSRP measurement to CONNECTED mode for eMTC | 16.6.0 |
| 2020-06 | RAN#88 | RP-200962 | 6902 | 2 | B | Introduction of requirements for preconfigured uplink resource transmission for cat-M1 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200983 | 6906 | | A | Correction to RRC release with redirection requirements in 36.133 Rel-16 | 16.6.0 |

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| 2020-06 | RAN#88 | RP-201042 | 6907 | | B | Interruption due to BWP switching at consistent UL failure in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200969 | 6908 | 1 | B | Applicability of 2-step RA and 4-step RA in RRM requirements in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-201047 | 6909 | 1 | B | CR on 36133 interruption requirements for BWP switching on multiple CCs | 16.6.0 |
| 2020-06 | RAN#88 | RP-200963 | 6910 | | F | CR on 36133 LTE CHO | 16.6.0 |
| 2020-06 | RAN#88 | RP-201042 | 6911 | | B | RRC release with redirection requirements in NR-U in 36.133 | 16.6.0 |
| 2020-06 | RAN#88 | RP-200990 | 6912 | | A | Finalisation of requirements in 36.133 R16 | 16.6.0 |
| 2020-09 | RAN#89 | RP-201512 | 6916 | | A | Correction to intra-frequency event triggered reporting test case in CEModeA | 16.7.0 |
| 2020-09 | RAN#89 | RP-201500 | 6917 | 1 | B | NR CGI measurements with autonomous gaps for 36.133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201497 | 6922 | | F | 36.133 CR on cell identification in connected mode for EUTRAN-NR measurement for Rel-16 NR HST | 16.7.0 |
| 2020-09 | RAN#89 | RP-201497 | 6924 | | F | Correction to cell re-selection for EUTRAN-NR high speed in TS36.133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201500 | 6925 | | B | Impact of CGI reading on RLM | 16.7.0 |
| 2020-09 | RAN#89 | RP-201512 | 6931 | 1 | B | CR to TS 36.133 to address NR-U inter-RAT measurements | 16.7.0 |
| 2020-09 | RAN#89 | RP-201506 | 6932 | | F | CR 36.133 (8.17.2.2.a) Clarification of UE behaviour | 16.7.0 |
| 2020-09 | RAN#89 | RP-201509 | 6933 | | F | CR on serving cell measurement on non-anchor carrier for NB-IoT | 16.7.0 |
| 2020-09 | RAN#89 | RP-201509 | 6934 | 1 | F | CR on PUR requirements for NB-IoT | 16.7.0 |
| 2020-09 | RAN#89 | RP-201512 | 6936 | | A | CR on NB-IoT Intra frequency with serving cell measurement relaxation test case 4.2.38 R16 (Cat A) | 16.7.0 |
| 2020-09 | RAN#89 | RP-201511 | 6938 | | F | Draft CR on DAPS handover | 16.7.0 |
| 2020-09 | RAN#89 | RP-201512 | 6941 | | A | Correction on UE measurement capability in NR idle mode R16 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201512 | 6943 | | A | CR to measurement capability for NE-DC in 36133 R16 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201494 | 6944 | 2 | B | CR to introduce EMR in 36.133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201494 | 6945 | | B | CR on interruption for direct activation of multiple SCells 36133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201494 | 6946 | 2 | B | CR on interruption requirements for SCell dormancy 36133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201500 | 6948 | 1 | F | CR to 36.133 for CGI reading | 16.7.0 |
| 2020-09 | RAN#89 | RP-201508 | 6949 | 1 | F | CR on RSS based measurement requriements | 16.7.0 |
| 2020-09 | RAN#89 | RP-201508 | 6950 | 1 | F | CR on RLM requriements based on enhanced MPDCCH | 16.7.0 |
| 2020-09 | RAN#89 | RP-201508 | 6951 | 1 | F | CR on PUR related requirements | 16.7.0 |
| 2020-09 | RAN#89 | RP-201508 | 6953 | 1 | B | Introduction of measurement accuracy requirements for RSS based RSRP measurements for cat-M1/M2 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201508 | 6954 | 1 | F | Correction of eMTC DL channel quality report mapping table and RSS measurement requirements | 16.7.0 |
| 2020-09 | RAN#89 | RP-201512 | 6955 | 1 | B | RRC_IDLE state inter-RAT moblity requirements for NR-U | 16.7.0 |
| 2020-09 | RAN#89 | RP-201506 | 6956 | | F | Correction to RACH delay in HO delay requirements in NR-U | 16.7.0 |
| 2020-09 | RAN#89 | RP-201506 | 6957 | | F | Correction to RACH delay in RRC release requirements in NR-U in 36.133 | 16.7.0 |
| 2020-09 | RAN#89 | RP-201500 | 6959 | | B | CR to 36.133 on CGI reading of E-UTRA cell in NE-DC | 16.7.0 |
| 2020-12 | RAN#90 | RP-202433 | 6962 | 1 | B | CR for TS36.133, Adding requirements for CSI-RS based L3 measurement | 16.8.0 |
| 2020-12 | RAN#90 | RP-202442 | 6963 | | F | CR to TS 36.133: Add information on the inter-band EN-DC configurations with no DL interruption | 16.8.0 |
| 2020-12 | RAN#90 | RP-202435 | 6964 | 1 | F | CR on IDLE state cell re-selection requirements for HST in 36.133 | 16.8.0 |
| 2020-12 | RAN#90 | RP-202512 | 6967 | | A | CR on maintaining V2X test cases in TS36.133 R16 | 16.8.0 |
| 2020-12 | RAN#90 | RP-202475 | 6968 | | B | Test cases for inter-frequency DAPS handover | 16.8.0 |
| 2020-12 | RAN#90 | RP-202479 | 6969 | 1 | F | Correction on the synchronous condition for DAPS handover | 16.8.0 |
| 2020-12 | RAN#90 | RP-202483 | 6970 | | F | CR on PUR requirements for NB-IoT | 16.8.0 |
| 2020-12 | RAN#90 | RP-202483 | 6971 | 1 | F | CR on RRM requirements for short DRX with eDRX configured for Rel-16 NB-IoT | 16.8.0 |
| 2020-12 | RAN#90 | RP-202444 | 6972 | 1 | F | CR to 36.133: Correction to NR CGI reading interruption requirements | 16.8.0 |
| 2020-12 | RAN#90 | RP-202444 | 6973 | 1 | B | CR to 36.133: Introduce requirements for mandatory gap pattern | 16.8.0 |
| 2020-12 | RAN#90 | RP-202430 | 6976 | 2 | B | CR on EMR requirements in 36.133 | 16.8.0 |
| 2020-12 | RAN#90 | RP-202444 | 6978 | 1 | F | CR on CGI reading requirements 36.133 | 16.8.0 |

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| 2020-12 | RAN#90 | RP-202478 | 6979 | 1 | F | CR on RSS measurement requirements | 16.8.0 |
| 2020-12 | RAN#90 | RP-202478 | 6980 | 1 | B | CR to introduce measurement requirements for eMTC in RRC_Inactive | 16.8.0 |
| 2020-12 | RAN#90 | RP-202494 | 6984 | 1 | F | CR on performance requirements tests for euCA. | 16.8.0 |
| 2020-12 | RAN#90 | RP-202491 | 6987 | | A | CR 36.133 Correction to test cases for SCell Hibernation (Rel-16) | 16.8.0 |
| 2020-12 | RAN#90 | RP-202430 | 6988 | 1 | F | CR 36.133 Removal of brackets for NR SCell Dormancy | 16.8.0 |
| 2020-12 | RAN#90 | RP-202486 | 6990 | | A | CR 36.133 Removal of brackets for SFTD measurements (Rel-16) | 16.8.0 |
| 2020-12 | RAN#90 | RP-202444 | 6996 | 1 | F | Maintenance CR on NR CGI reading in 36.133 | 16.8.0 |
| 2020-12 | RAN#90 | RP-202479 | 6997 | 1 | F | Correction on LTE conditional handover | 16.8.0 |
| 2020-12 | RAN#90 | RP-202414 | 6999 | 1 | F | Terminology updates for NR-U | 16.8.0 |
| 2020-12 | RAN#90 | RP-202444 | 7000 | | F | Missing requirements for LTE SRS carrier-based switching | 16.8.0 |
| 2020-12 | RAN#90 | RP-202513 | 7005 | | A | Correction to test parameters for FDD and TDD intra-frequency RSRP for Cat-M1 UE in CEModeA | 16.8.0 |
| 2020-12 | RAN#90 | RP-202475 | 7008 | | B | Introduction of intra-frequency sync and async LTE DAPS HO test cases | 16.8.0 |
| 2020-12 | RAN#90 | RP-202478 | 7009 | 1 | F | Correction to RSS based measurement requirements | 16.8.0 |
| 2020-12 | RAN#90 | RP-202473 | 7010 | | B | Big CR: Introduction of Rel-16 eMTC RRM performance requirements (TS 36.133) | 16.8.0 |
| 2020-12 | RAN#90 | RP-202474 | 7011 | | B | Big CR: Introduction of Rel-16 Nb-IoT RRM RRM performance requirements (TS 36.133) | 16.8.0 |
| 2020-12 | RAN#90 | RP-202475 | 7012 | | B | Test cases for LTE conditional handover | 16.8.0 |
| 2021-03 | RAN#91 | RP-210120 | 7021 | | A | CR: Correction of eMTC RLM test cases | 16.9.0 |
| 2021-03 | RAN#91 | RP-210105 | 7023 | 1 | F | Correction Rel-16 eMTC RRM performance requirements | 16.9.0 |
| 2021-03 | RAN#91 | RP-210071 | 7025 | | F | CR on interruption requirements of BWP switch on multiple CCs for EN-DC | 16.9.0 |
| 2021-03 | RAN#91 | RP-210108 | 7027 | 1 | F | CR on maintenance for measurement on non-anchor carrier for NB-IoT | 16.9.0 |
| 2021-03 | RAN#91 | RP-210107 | 7029 | 1 | F | Clarification on asynchronous DAPS handover | 16.9.0 |
| 2021-03 | RAN#91 | RP-210104 | 7031 | 1 | B | Test cases for inter-frequency DAPS handover | 16.9.0 |
| 2021-03 | RAN#91 | RP-210114 | 7036 | | F | Clarification for performance requirements tests for euCA | 16.9.0 |
| 2021-03 | RAN#91 | RP-210115 | 7039 | | A | CR 36.133 (A.8.16.106) Correction of test case for direct Scell activation at addition | 16.9.0 |
| 2021-03 | RAN#91 | RP-210087 | 7041 | | F | CR 36.133 Removal of brackets for Scell dormancy | 16.9.0 |
| 2021-03 | RAN#91 | RP-210104 | 7043 | | B | CR on 36.133 LTE FDD-TDD inetr-F sync DAPS HO TCs | 16.9.0 |
| 2021-03 | RAN#91 | RP-210084 | 7045 | 1 | F | Terminology updates for NR-U in 36.133 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210104 | 7047 | 1 | F | Addition of missing async FDD-TDD and TDD-FDD LTE interband interfrequency DAPS handover tests | 16.9.0 |
| 2021-03 | RAN#91 | RP-210084 | 7049 | | F | Applicability of RA with CCA on RRM requirements in NR-U in 36.133 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210121 | 7052 | | A | Correction to applicability of E-UTRAN E-CID measurements requirements for NE-DC | 16.9.0 |
| 2021-03 | RAN#91 | RP-210119 | 7056 | | A | Correction to requirements for NCSG patterns | 16.9.0 |
| 2021-03 | RAN#91 | RP-210117 | 7059 | | A | CR to remove intra-frequency ECID requirements for NE-DC 36.133 R16 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210117 | 7062 | | A | CR to idle more requirements in 36.133 R16 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210087 | 7064 | 1 | F | CR on EMR requirements in 36.133 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210081 | 7068 | 1 | F | CR to intorduce new measurement gap patterns for positioning in 36.133 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210071 | 7070 | | F | CR on CGI reading report delay 36.133 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210105 | 7072 | 1 | F | CR on eMTC RRM requirements | 16.9.0 |
| 2021-03 | RAN#91 | RP-210113 | 7075 | | A | CR on TC for eMTC RSTD measurement R16 | 16.9.0 |
| 2021-03 | RAN#91 | RP-210112 | 7078 | | A | CR on CRS muting for eMTC R16 | 16.9.0 |
| 2021-06 | RAN#92 | RP-211093 | 7082 | 1 | F | ime synchronization assumption for RSS-based neighbor cell measurements | 16.10.0 |
| 2021-06 | RAN#92 | RP-211095 | 7084 | | F | CR on core requirements maintenance of IDLE mode inter-RAT measurement for NR-U R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211095 | 7086 | | F | CR on PSCell Addition requirements for NR-U R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211098 | 7090 | | F | CR on maintenance of BWP Switch on multiple CCs 36133 R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211107 | 7099 | | A | CR on requirements of cell reselection for NB-IoT R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211093 | 7105 | 1 | F | Correction of RLM test parameters for MPDCCH performance improvement | 16.10.0 |
| 2021-06 | RAN#92 | RP-211088 | 7106 | | A | Correction to interruption to LTE serving cells for measurements on deactivated NR SCell_R16 | 16.10.0 |

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| 2021-06 | RAN#92 | RP-211089 | 7110 | | A | CR on applicability of requirements for NE-DC operation and SMTC determination 36133 R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211119 | 7114 | | F | CR on LTE-NR EMR requirements 36133 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211119 | 7116 | | B | Big CR: Introduction of Rel-16 MR-DC EMR RRM performance requirements (TS 36.133) | 16.10.0 |
| 2021-06 | RAN#92 | RP-211109 | 7118 | | F | CR on MG for PRS measurement 36.133 R16 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211095 | 7125 | | F | Terminology updates for NR-U in 36.133 | 16.10.0 |
| 2021-06 | RAN#92 | RP-211095 | 7127 | | B | Big CR: Introduction of Rel-16 NR-U RRM performance | 16.10.0 |
| 2021-09 | RAN#93 | RP-211923 | 7133 | | A | Big CR to TS 36.133: LTE RRM maintenance (Rel-16) | 16.11.0 |
| 2021-12 | RAN#94 | RP-212847 | 7135 | | F | Big CR to TS 36.133: LTE RRM maintenance (Rel-16) | 16.12.0 |
| 2022-03 | RAN#95 | RP-220336 | 7146 | | F | Big CR to TS 36.133: LTE RRM maintenance (Rel-16) | 16.13.0 |
| 2022-06 | RAN#96 | RP-221653 | 7161 | | F | Big CR on TS 36.133 Maintenance (Rel-16) | 16.14.0 |
| 2022-09 | RAN#97 | RP-222054 | 7168 | | A | Correction of Configuration Parameters for Test 1 in Test Case A.7.1.11 | 16.15.0 |
| 2022-09 | RAN#97 | RP-222026 | 7179 | | F | Big CR for 36.133 maintenance (Rel-16) | 16.15.0 |
| 2023-03 | RAN#99 | RP-230500 | 7197 | 1 | F | Editorial corrections in TS 36.133 | 16.16.0 |
| 2023-06 | RAN#100 | RP-231355 | 7212 | | A | Correction to inter-RAT NR measurement requirements_R16 | 16.17.0 |
| 2023-09 | RAN#101 | RP-232486 | 7241 | | F | [LTE_feMob-Core] CR on CHO requirements | 16.18.0 |
| 2023-10 | RAN#101 | | | | | Editorial changes by MCC | 16.18.1 |
| 2023-10 | RAN#101 | | | | | Update change history omitted in 16.18.1 | 16.18.2 |
| 2023-12 | RAN#102 | RP-233336 | 7270 | | A | [NB_IOTenh2-Perf] CR to 36.133 for correcting errors on the PHR table for NB1 UEs | 16.19.0 |
| 2024-03 | RAN#103 | RP-240576 | 7281 | 1 | F | (NR_unlic-Core) CR on NR Measurements when CCA is used-Rel16 | 16.20.0 |
| 2024-09 | RAN#105 | RP-242154 | 7340 | | A | (NB_IOT-Perf) CR on RSRP-ThresholdsNPRACH-InfoList for NB-IoT (Cat-A Rel-16) | 16.21.0 |
| 2024-09 | RAN#105 | RP-242154 | 7345 | | A | (NB_IOTenh-Perf) CR on RSRP-ThresholdsNPRACH-InfoList for NB-IoT (Cat-A Rel-16) | 16.21.0 |
| 2024-09 | RAN#105 | RP-242154 | 7349 | | A | (NB_IOTenh2-Perf) CR on RSRP-ThresholdsNPRACH-InfoList for NB-IoT (Cat-A Rel-16) | 16.21.0 |
| 2025-03 | RAN#107 | RP-250588 | 7369 | | F | (NR_unlic-Perf) CR on maintenance for NR-U 36.133 R16 | 16.22.0 |

# History

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|---|---|---|
| V16.6.0 | September 2020 | Publication |
| V16.7.0 | December 2020 | Publication |
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